Engineering Feasibility Study



Black Creek



BLACK CREEK ENGINEERING FEASIBILITY STUDY

HAMILTON, INDIANA

October 2006

Prepared for:

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1.0 EXECUTIVE SUMMARY

Evidence of water quality impairment in the Black Creek watershed is documented through photographs of sediment plumes, the presence of sediment deltas at the mouth of Black Creek's discharge into Hamilton Lake, the loss of trees and streambanks to erosion along Black Creek, and the need for lake residents to extend docks near Black Creek to support continued boat access. Given this evidence of water quality impairments DES has focused our efforts on the Black Creek watershed.

The goals and objectives of this study include the following:

- Determine the feasibility of construction sites for proposed structures and/or other pollution control activities such as Best Management Practices (BMPs).
- Complete necessary engineering activities and computations to complete the determination of engineering feasibility.
- Recommend structures and/or activities for implementation.

This study presents watershed specific observations and identified sediment loads to Black Creek and ultimately Hamilton Lake. This study has identified enhancements, which will reduce new sediment loads to the lake. However, none of these enhancements will address the sediment that has built up over the years at the discharge of Black Creek into Hamilton Lake. Given access constraints of the sites, project implementation costs will be higher than normal to implement these water quality enhancement projects.

DES's recommendations are as follows:

- 1. Address the sediment discharging into Hamilton Lake by constructing streambank stabilization in the areas noted in this study.
- 2. Begin preparation of a Sediment Management Plan and grant preparation activities in preparation for limited spot dredging at the discharge of Black Creek into Hamilton Lake.
- 3. Work with the Steuben County Soil and Water Conservation District (SWCD) office to assist them in implementing watershed level practices such as buffer strips and grade control structures in the upper reaches of the watershed, with priority placed on recommended buffer strip locations identified in this study.

The estimated cost to implement all recommendations contained herein is approximately \$250,000.

2.0 ACKNOWLEDGEMENTS

Dynamic Environmental Services, Inc. (DES) would like to thank the following organizations for assistance in this study effort: Hamilton Lake Association (HLA), Indiana Department of Natural Resources (IDNR) Lake and River Enhancement (LARE), the Steuben Country SWCD, numerous local Steuben Country government agencies, and the landowners in the Black Creek watershed and Hamilton, Indiana. Assistance included many forms including providing data, recommendations, and field support. Without this assistance, this study would not be possible.

3.0 INTRODUCTION

3.1 Background

DES was retained by HLA in January 2006 to perform a lake enhancement engineering feasibility study (EFS) for Black Creek. Black Creek is the most significant non-point pollution source in the Hamilton Lake watershed. The LARE program provided funding to the HLA to perform this EFS. Previously LARE funded activities at Hamilton Lake included a diagnostic feasibility study in 1989, the design of constructed wetland in 1999, and the construction of a constructed wetland in 2000. Over the last several years, the HLA has had weed surveys and weed spraying performed to control invasive aquatic vegetation, also funded by LARE and local match funding.

3.2 Study Scope

The Scope of Work (SOW) for this project was modeled after the LARE Technical Requirements of Engineering Feasibility Studies. The scope was modified to reflect DES' professional insight, discussions, and experience working with the HLA during the LARE grant preparation process.

The SOW specifically included the following nineteen (19) tasks:

- 1. Identification of Potential Construction Sites
- 2. Complete Engineering Calculations
- 3. Facilitate Public Meetings Regarding the Proposed Project
- 4. Create a Public Information Handout
- 5. Project Progress Reporting
- 6. Complete Conceptual Drawings
- 7. Determine Probable Project Costs and Timelines
- 8. Determine Easements and Land Availability
- 9. Determine Unusual Physical and/or Social Costs of the Proposed Project
- 10. Complete a Flood State Analysis (if required)
- 11. Determine Functionality and/or Impact of Proposed Projects
- 12. Conduct a Wetland Functional Assessment or Vegetation Survey
- 13. Evaluate Biological and Habitat Integrity Downstream of Proposed Sites
- 14. Determine Funding Sources and Capacity for Local Funding
- 15. Conduct an Environmental Impact Assessment
- 16. Document Justification for Proposed Project Site Selection
- 17. Complete Early Coordination Process for Permits
- 18. Complete Engineering Feasibility Report
- 19. Update Outdated Parameters and Address Information Gaps

3.3 Study Goals and Objectives

Evidence of water quality impairment in the Black Creek watershed is documented through photographs of sediment plumes, the presence of sediment deltas at the mouth of Black Creek's discharge into Hamilton Lake, the loss of trees and streambanks to erosion along Black Creek, and the need for lake residents to extend docks near Black Creek to support continued boat access. Given this evidence of water quality impairments DES has focused our efforts on the Black Creek watershed.

The goals and objectives of this study include the following:

- Determine the feasibility of construction sites for proposed structures and/or other pollution control activities such as Best Management Practices (BMPs).
- Complete necessary engineering activities and computations to complete the determination of engineering feasibility.
- Recommend structures and/or activities for implementation.

4.0 DESCRIPTION OF STUDY AREA

In general, information predominantly about the Black Creek watershed will be presented in this section since the scope of this study concentrates on the Black Creek watershed.

4.1 Location

Hamilton Lake is a natural lake located in Otsego Township in Steuben County in the northeastern corner of Indiana in the town of Hamilton (Figure 1). Hamilton Lake discharges over a dam into Fish Creek, a tributary of the St. Joseph River.

4.2 Lake and Watershed Characteristics

Hamilton Lake has a surface area of approximately 836 acres as computed from Geographic Information System (GIS) files obtained from the Steuben County GIS office. The Hamilton Lake watershed is located in the 14-digit hydrologic unit code (HUC) of 04100003050040 — Hamilton Lake/Black Creek. The Hamilton Lake watershed is approximately 10,600 acres, inclusive of Hamilton Lake (Figure 2). Figure 3 shows the lake and its bottom contours (bathymetry). The maximum depth of the lake is approximately 70 feet. Average depth has been reported to be approximately 21 feet (Harza, 1990). Lake volume, utilizing the above lake surface area and approximate average depth is 17,561 acre-feet.

The drainage from the Hamilton Lake watershed into Hamilton Lake is predominantly from three main inlets from the west, east, and northeast. Black Creek is by far the largest tributary to the lake. Black Creek drains approximately 6,104 acres or 63% of the total watershed (Figure 4).

4.2 Summary of Historical Studies

A Lake Enhancement Feasibility Study was performed for Hamilton Lake by Harza Engineering Company (Harza) in 1990. The major findings of this study were as follows:

- Hamilton Lake water quality is moderately alkaline and fertile.
- Grasslands, either in the form of Conservation Reserve Program (CRP) set-aside lands, hayfields, or other idle lands are the most common land use, with crop land second.
- Approximately 61% of the lake's total watershed is considered to be highly erodible land.
- Black Creek's watershed contains about 56% of the highly erodible soils in the watershed, with approximately 75% of this highly erodible land being used for row crop production.

- The empirical phosphorus model predicted a mean annual water column total phosphorus concentration of 0.044 mg/L, indicative of a eutrophic lake.
- The Harza study recommended construction of a series of wetlands in the watershed to trap sediments and their associated nutrients before discharge into the lake.

4.3 Soils

The Hamilton Lake watershed is primarily composed of Glynwood-Morley-Blount soils series, described as deep, nearly level to moderately sloping, well drains to very poorly drained, silty soils on till plains (SCS, 1981).

A detailed soil survey map for the lower portion of the Black Creek watershed is shown in Figure 5. Soils of interest are found along Black Creek from Hamilton Lake to County Road 600E. Soil types found in this area include:

- Co Cohoctah sandy loam
- CaD2 Casco gravelly sand loamy, 1 to 18 percent slopes, eroded
- KsC Kosciusko gravelly sandy loam, 6 to 12 percent slopes
- BnA Blount silt loam, 0 to 3 percent slopes
- Sh Shoals loam
- Wa Wallkill silt loam
- MoE2 Morley silt loam, 18 to 25 percent slopes, eroded
- MoC2 Morley silt loam, 6 to 12 percent slopes, eroded
- Mn Milford silty clay loam

General descriptions of each of these soil types are included in Appendix A. In general, each of these identified soils is either silt, sand or clay loams, all of which pose no constructability issues.

4.4 Land Use and Topography

Land use in the watershed was reviewed from recent aerial photographs. Land use in the Black Creek watershed is primarily used for agricultural purposes, pasture or row crops. There are a number of CRP site and field buffers along Black Creek throughout the watershed. As Black Creek gets closer to Hamilton Lake a majority of the creek discharges through densely wooded forest land.

Topography in the Black Creek watershed consists predominantly of rolling hills. Elevations at the upper end of the Black Creek watershed are up to approximately 1,000 feet mean sea level (MSL) while those at the discharge of Black Creek into Hamilton Lake are approximately 900 feet MSL. Therefore, a change in elevation of approximately 100 feet occurs from the upper ends of the Black Creek watershed to the discharge at Hamilton Lake. A plot of a portion of Black Creek's stream gradient is provided in Appendix B. It can generally be seen that for the lower portion of the Black Creek watershed, stream slopes range from approximate 0.1 to 0.65% slope. The largest slopes are located from approximately Route 1 up to CR550E. It is in this lower section of the watershed where the most streambank erosion is evident, likely caused by high water velocities in this area.

4.5 Existing Watershed Enhancements

Historical and existing efforts have been attempted to improve the water quality that is discharging from Black Creek into Cedar Lake. In the late 1990s and early 2000s, a constructed wetland was installed along Haughey Ditch just before discharge into Black Creek. This was a LARE funded project. As can be seen in some habitat evaluations provided later in this report, this wetland appears to be having a positive impact on water quality and watershed habitat. However, no site-specific quantitative laboratory analysis data are available to provide for comparison and assessment purposes. Additionally, the Steuben County SWCD has invested a lot of resources (time and money) into enrolling land owners into the CRP program and stream buffer programs. Although no site-specific quantitative laboratory analysis data are available to provide for comparison and assessment purposes, it is evident that positives impacts on Black Creek water quality have occurred as streambanks are stable in the upper watershed and there is no wide spread evidence of gulley and rill erosion in fields along Black Creek.

5.0 IDENTIFICATION OF FEASIBLE PROJECTS

The scope of this project was to identify structures and/or BMPs to improve water quality discharging from Black Creek into Hamilton Lake. To do this, DES conducted a field survey of Black Creek and its major tributaries on April 25, 2006. Results of this survey including observations, pictures, maps, and recommendations are provided in detail in Appendix C. Applicable information from this appendix is included in this section.

5.1 Site Description and Alternatives

A number of locations, as shown in Figures 8, 9, 10, and 11, were identified where streambank stabilization would aid in reducing erosion directly into Black Creek. Site specific observations are detailed in Appendix C. Evidence of historical and current streambank erosion is evident in these areas. Approximately 650 feet of streambanks downstream of Route 1 (1,300 feet considering both streambanks) and approximately 450 feet of streambanks (one side of stream only) between Route 1 and CR550E should be stabilized utilizing harbor armoring and/or vegetative means. Conceptual drawings detailing common erosion control measures for eroding streambanks are shown in Figures 12 through 18. There techniques have a wide range of cost and complexity. Techniques include:

- 1. Simple erosion control matting which is designed to reduce shear stresses from water flow, which causes bank erosion (Figure 12). Stabilization with erosion control matting allows vegetation to establish on streambanks and provides a level of erosion protection greater than just vegetation and soil can by itself.
- 2. Cellular confinement or geocells are simply a "honeycomb" grid (generally constructed of plastic) that provides a stable framework or foundation in which soil and vegetation can be maintained and erosion potential reduced (Figure 13).
- 3. Coir rolls are circular "logs" constructed of coconut fiber, generally in twelve or 18" diameter rolls (Figure 14). These are placed at the "toe" of eroding streambanks and provide protection for this area which is exceptionally prone to erosion. Frequently, coir rolls are vegetated with native plants to provide habitat, improve aesthetics, and provide additional erosion protection.

- 4. Live staking is the practice of vegetating streambanks to provide erosion protection (Figure 15). Typical "staking" is performed with willow trees or other native shrubs and trees.
- 5. Rip-rap is a very common technique that is ubiquitously used (Figure 16). Rip-rap is the placement of large sized stones, specifically designed for site-specific stream flow velocities, to reduce erosion. Rip-rap is common because of its relatively low cost and ease of installation. It is generally not a favored technique in natural systems unless glacial stone is used as the rip-rap material. It is not favored as rip-rap provides little to no habitat value and it is not aesthetically pleasing.
- 6. Gabion baskets and mattresses are another possible stabilization technique (Figure 17). Gabions are large rocks and stones contained in a wire mesh basket. Baskets and mattresses can be made to order. Standard gabion mattress sizes are generally six inches thick, six feet wide, and lengths of nine or twelve feet. Gabion baskets generally have widths of three feet; lengths of six, nine, or twelve feet; and heights of one, 1.5, or three feet. These structures are very effective; however, they are expensive relative to other erosion protection measures. Unless soil is added on top of these baskets or they are vegetated in some way, they also provide little to no habitat benefit. However, they are generally more aesthetically pleasing than rip-rap and have far less operation and maintenance concerns.
- 7. Rock deflectors can be an effective technique for streams where there are significant bends and turns, such as Black Creek (Figure 18). Rock deflectors are designed to "deflect" flow away from the eroding streambank and to redirect it into the stream. "Deflectors" are typically constructed with rip-rap or gabions.

Sheet piling or seawall is another possible technique for streambank erosion protection. Sheet piling, as used to protect lake frontage, is a very effective erosion control technique. However, it is very expensive, provides no habitat value, and it would be very difficult to install in most locations in Black Creek as it requires significant heavy machinery for installation and Black Creek access is generally limited because of its forested habitat. Therefore, sheet piling is not considered feasible.

Grade control alternatives are conceptually shown in Figures 19 and 20. Grade control structures drop water from one level to another, preventing gouging out gullies or streambed erosion. They can also help to control flooding and trap the sediment moving with runoff water. Grade control structures are typically built across an existing gulley, a grassed waterway, or the outlet of a waterway. Grade control structures are most effective for 1st order streams or those smaller streams located in the upper reaches of the Black Creek watershed. Downstream sections of the Black Creek watershed will likely have storm stream flows and velocities that will preclude their use.

5.2 Land Availability Determination

For those areas where improvements are recommended, landowner information has been tabulated in Appendix D. Landowners have provided verbal authorization for enhancement on their properties with the understanding that design details would be

presented at a later date and negotiated with each individual landowner. DES will assist the HLA in obtaining the necessary easements from the landowners of interest.

5.3 Permit Requirements

Federal, state and local units of government have regulations related to the proposed BMPs and construction projects that may impact wetlands, floodplains, stream, rivers, and lakes. Early permit coordination was performed with the Indiana Department of Natural Resources and the U.S. Department of Interior, Fish and Wildlife Service (Appendix E).

5.3.1 Federal Regulations and Permits

Section 404 of the Clean Water Act is the primary federal law regulating the discharge of dredged or fill material to waters of the United States. This law is embodied in federal regulations at 33 CFR Parts 320 through 331. The U.S. Army Corps of Engineers manages the permit program under Section 404 in cooperation with the U.S. Environmental Protection Agency. In Indiana, the Detroit District office issues 404 permits for the Black Creek watershed.

The Corps' determination of acceptability of any proposed discharge of dredged or fill material considers the probable environmental effect of the proposed discharge on the public interest. This determination typically involves checking compliance with:

- Endangered Species Act
- National Historic Preservation Act
- Fish and Wildlife Coordination Act
- Other federal laws
- State environmental regulations

Section 404 authorizations "Individual Permits" (IP), "Nationwide Permits" (NWP) or "Regional Permits". The type of permit required is determined according to the type of impact, the amount of impact, and the location of impact.

5.3.2 State Regulations and Permits

The Indiana Department of Environmental Management (IDEM) and the IDNR are the principal state agencies for enforcing state environmental regulations. IDEM is responsible for providing water quality certification for discharges of dredged or fill material under Section 401 of the Clean Water Act. Without Section 401 Water Quality Certification (or a waiver of this certification), the Corps of Engineers (Corps) is not allowed to issue a Section 404 permit.

Projects requiring a Section 404 permit from the Corps, also require a 401 certification, or a waiver, by IDEM. Using the State's water quality standards as its guide (327 IAC 2), the Department determines if a proposed project will adversely affect the quality of the waters of the State. Under Section 401, the IDEM must act on a certification request within 60 days from the receipt of a complete application.

The Indiana Water Quality Standards (327 IAC 2) include policies of maintenance of existing uses and non-degradation of water quality. IDEM's granting of Section 401 Water Quality Certification (WQC) indicates that a proposed project will comply with the Standards. Certifications may include limitations, conditions or any other provisions, which IDEM deems necessary to assure that the Standards will not be violated. If IDEM has not given a blanket WQC for a particular NWP, then an individual WQC from IDEM will be necessary. For 404 NWP, the IDEM may have already granted a blanket certification with special conditions.

The IDNR requires a joint permit application for construction within a floodway of a stream or river, navigable waterway, public fresh water lake, and ditch reconstruction. The joint application can be used for: (1) alternation of the bed or shoreline of a public freshwater lake; (2) construction or reconstruction of any ditch or drain having a bottom depth lower than the normal water level of a freshwater lake of 10 acres or more and within ½ mile of the lake; (3) construction within the floodway of any river or stream; (4) placing, filling, or erecting a permanent structure in; water withdrawal from; or material extraction from; a navigable waterway; (5) extraction of mineral resources from or under the bed of a navigable waterway; and (6) construction of an access channel.

The IDEM Rule 5: Storm Water Runoff Associated with Construction Activity, is intended to reduce pollutants in storm water discharges into surface waters of the state. The requirements of Rule 5 apply to all persons who are involved in construction activity that results in the disturbance of one acre or more of land.

5.3.3 Local Permits

The Indiana Drainage Code gives county surveyors authority over "legal drains". Legal drain status is maintained by the Steuben County Surveyor's Office for areas of the Black Creek watershed upstream of CR550E. None of the proposed improvements are located on legal drains and they are therefore exempt from regulation by the Drainage Board.

Table 5-1
PERMIT REQUIREMENTS

	Vegetative Filters	Check Dams	Bank Stabilization
Floodway Permit	n/a if not impacting Waters of the U.S.	If watershed above improvement > 1 mi ²	If watershed above improvement > 1 mi ²
401 Certification	Possible	Required	Required
USACE Permit	Possible	Required	Required
IDEM Rule 5	If BMP area > 1 ac	If BMP area > 1 ac	If BMP area > 1 ac
Dam Safety Permit	Possible	Required	Required
Drainage Permit	n/a	n/a	n/a

5.4 Environmental Assessment

We have opted to mimic the guidelines of the U.S. Environmental Protection Agency's Clean Lakes Program in order to assess the environmental effects of proposed projects. These guidelines involve a checklist approach to impact assessment and can be found at 40 CFR, Part 35, Subpart H. These guidelines involve 14 questions that may be satisfactorily answered with a mere "Yes" or "No", but should detail important benefits or adverse effects sufficiently to allow for mitigation planning during the design and implementation phases.

Appendix F provides the results of the Environmental Assessment. None of the proposed projects have significant adverse effects on the physical, biological or social environment. The small scale of the proposed projects limit their adverse effects on environmental resources.

5.5 Habitat Evaluation

Appendix G includes a habitat evaluation of a number of locations throughout the Black Creek watershed. The locations and habitat evaluation scores are found on Figure 7. The habitat evaluation was performed utilizing the Citizens Qualitative Habitat Evaluation Index (CQHEI). This index was developed by the Ohio Environmental Protection Agency as a "Citizens" companion to the Qualitative Habitat Evaluation Index (QHEI) used by the state's professional staff (Hoosier Riverwatch, 2005). The purpose of the index is to provide a measure of the stream habitat and riparian health that generally corresponds to physical factors affecting fish and other aquatic life. The CQHEI produces a score that can be used to compare sites to each other or compare one site over time. Scores greater than 60 have been found to be "generally conducive to the existence of warmwater fauna."

As can be seen in Figure 7, generally the best habitat, as measured by the CQHEI, occurs in the lower reaches of Black Creek from approximately County Road 600E to Hamilton Lake. Additionally, the habitat in Haughey Ditch scores high also. Generally, the upper areas of the watershed score much lower.

5.6 Unusual Physical and Social Costs

Through the course of public meetings, residents of Hamilton Lake expressed concern that recommended solutions provide not only water quality benefits but also aesthetic benefits. The citizens expressed their desires to have something natural that could blend into and/or complement the existing landscape. The public also expressed concern of flooding that is prevalent throughout areas of the Hamilton Lake watershed.

No unusual physical or social costs have been identified for the identified enhancement projects. Including native plantings in the enhancement projects will add small costs to these projects, less than 15%.

5.7 Constructability

As has been previously mentioned, access to a number of proposed enhancement areas will be difficult for heavy construction equipment that would be most useful in performing a number of these recommended enhancement efforts (i.e. backhoes and large trucks). This is most prevalent in the highly wooded forested floodplains, which are densely wooded and in places have very high and steep bluffs. Permits issued for this project will very likely require minimal disturbance to the stream, streambed, and streambanks, which will preclude driving construction traffic up and down Black Creek. This would have been a historical accepted practice to allow easy access to a construction area. Therefore, it is possible that some access roads will need to be constructed in areas of the forested floodplain. This might include the cutting and removal of trees, the installation of culverts, or possibly the installation of access roads (grading and rock). Because of the limitations on access, the time and costs to perform this work will increase accordingly. As part of the permitting process, the permit engineer should understand these limitations and negotiate with the permitting authorities to gain access to work in the stream where it is not possible to perform enhancement efforts without some limited access to the stream and streambed.

Another important constructability constraint many times relates to utilities in and near proposed enhancement areas. The recommended enhancement alternatives presented herein do not include significant construction activities (deep foundation digging) which would impact buried utilities. In fact, the recommended enhancement activities are not known to occur near any public utilities. However, as part of the design and construction process, the engineer will be required to properly notify public utilities and request utility clearance. Additionally, the engineer should work closely with individually impacted landowners to ensure that any unknown utilities are not impacted. However, at this time, utilities are not considered a constructability issue for this project.

5.8 Budgetary Cost Estimates

This section tabulates budgetary costs based on DES's experience in similar types of projects. Costs presented herein are for budgetary purposes and will be modified and refined in design activities. Options for significant hard armoring have been presented below. Generally, because of high costs, these are very selectively utilized. Hence, for cost purposes, a unit cost has been presented; however, the budgetary cost estimate uses other less expensive armoring techniques.

Item	# Units	Cost/Unit ¹	Budgetary Cost
Streambank Stabilization –		\$150 / foot	
Hard Armor ²			
Streambank Stabilization –	1,750 linear feet	\$75 / foot	\$130,000
armor/vegetation			
Grade Control	5	\$4,000/each	\$20,000
Native Vegetation	5	\$1,000/each	\$5,000
Buffer Strips	7	\$500/acre ³	\$3,500
Mobilization/Demobilization	1	\$5,000/unit	\$5,000
Subtotal			\$163,500
Engineering @ 15%			\$25,000
Contract Administration @ 10%			\$16,000
Contingency @ 25%			\$40,000
Total			\$245,000

5.9 Project Justification and Estimation of Impact

The HLA is very interested in dredging and intends to apply for a LARE dredging grant. Dredging is a very expensive activity and one that you do not want to perform frequently. Therefore, it is important to control watershed sediment loading before dredging. The efforts identified above, once implemented, will reduce watershed sediment loading to Hamilton Lake.

6.0 CONCLUSIONS AND RECOMMENDATIONS

This study has presented watershed specific observations and identified sediment loads to Black Creek and ultimately Hamilton Lake. Specific locations to enhance water quality have been presented in the above sections.

Sediment deposition at the Black Creek discharge into Hamilton Lake is evident and is documented by many of the local residents. This deposition causes the following problems and impairments:

- Local residents can not access the lake without extending their docks.
- During many months of the year, fish and other aquatic species can not access Black Creek as they historically could.
- Sediment plumes and erosion in this area lead to an aesthetically unpleasing environment.

This study has identified enhancements, which will reduce new sediment loads to the lake. However, none of these enhancements will address the sediment that has built up over the years at the discharge of Black Creek into Hamilton Lake. Given access

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¹ Given access constraints of the sites, costs will be higher than normal.

² Erosion protection measures such as sheet piling and gabion baskets are shown for comparison purposes.

³ We have assumed a 30' wide buffer strip by 10,000 feet long total.

constraints of the sites, costs will be higher than normal to implement these water quality enhancement projects.

DES's recommendations are as follows:

- Address the sediment discharging into Hamilton Lake by constructing streambank stabilization in the areas noted in this study.
- Begin preparation of a Sediment Management Plan and grant preparation activities in preparation for limited spot dredging at the discharge of Black Creek into Hamilton Lake.
- Work with the Steuben County SWCD office to assist them in implementing watershed level practices such as buffer strips and grade control structures in the upper reaches of the watershed, with priority placed on recommended buffer strip locations identified in this study.

7.0 POTENTIAL FUNDING SOURCES

Funding agencies for similar types of projects include the branches of the United States Department of Agriculture (NRCS and the United States Forest Service), United States Department of Interior Fish and Wildlife Service, the United States Environmental Protection Agency, and the Corps. Many of these funding agencies provide money to the states, which in turn fund such programs as IDEM's Section 319 Nonpoint Source (NPS) Program. Other programs are financed at the state level, such as the LARE Program.

Not all the programs identified involve grants. Some provide long-term low interest loans to fund particular projects. In general, most of the programs require cost share requirements specifying non-federal contributions from 5 to 75%.

The most favorable sources of funding will likely be the LARE program, the 319 program and the Build Indiana program. HLA has had success winning grant money from the LARE program and should continue to explore this as a funding source. HLA should also consider applying for 319 program and Build Indiana funds however DES' experience suggests that these programs have many competing project types and are less inclined to fund needs similar to HLA's.

8.0 ACTION PLAN AND SCHEDULE

Overall the implementation of these projects will have several step-wise components:

- An application for design grants was prepared and submitted to the LARE office in January 2006.
- In August 2006 notice was provided that HLA was awarded a design project grant.
- In October 2006, HLA should solicit proposals from consultants to perform the design work.
- By the end of 2006, HLA should retain a consultant.
- In early 2007, the consultant should perform field investigations and related analyses. These efforts are needed to determine final design considerations including soils, surveying, and hydraulic impacts. This information is also needed

- to facilitate approval of permits. Materials compiled in this stage of effort should be used to make submittals to permitting agencies.
- A key element of implementation involves property owner coordination. Agreements must be reached among the individual property owner(s) before any improvements can be implemented. This should begin in the fall of 2006.
- The last element of the implementation action plan is design of the improvement measures. This effort will focus on the design and the preparation of bid documents for the project. This can be finalized in the spring of 2007.
- Following completion of the project design documents and the bid tendering, the project can be constructed. This could conceivable begin as early as the fall or early winter of 2007.

The implement steps may vary slightly from the schedule described above depending on local decisions related to the configuration of the facilities, permitting issues, or other factors. The following tasks are recommended:

- Property Owner(s) Coordination (October 2006). Acceptance of the proposed plan by affected property owner(s) will be critically important to successful and timely project implementation. Using the concepts in this study, the HLA should continue discussions with property owners in the project area. These discussions should focus on the likely timing of developments and the need for individual owners to commit land area to the project. Results of these discussions will directly impact the final configuration of the proposed improvement. Surveying in and around the proposed enhancement locations will be required.
- Grant Application (January 2007). In order to have sufficient funds to construct the designed improvements and to meet the schedule outlined, HLA should apply to the IDNR LARE Program in order to secure sufficient funds to construct the designed improvements. Additionally the HLA might consider applying to the LARE program for sediment removal (dredging) funding.

Table 8-1

ESTIMATED WATERSHED IMPROVEMENT SCHEDULE

Design Phase

LARE Grants Awarded
Consultant Proposals Requested
Finalize Land Easements
October 2006 – December 2006
Detailed Design and Engineering
Surveying
Geotechnical Sampling and Analysis
Construction Grant Applications
July 2006
October 2006 – December 2006
January 2007 – July 2007
February 2007
February 2007
January 2007

Construction Phase

Grant Award July 2007

Construction Bids/Selection September 2007 Mobilization September 2007

Project Construction September 2007 – November 2007

9.0 REFERENCES

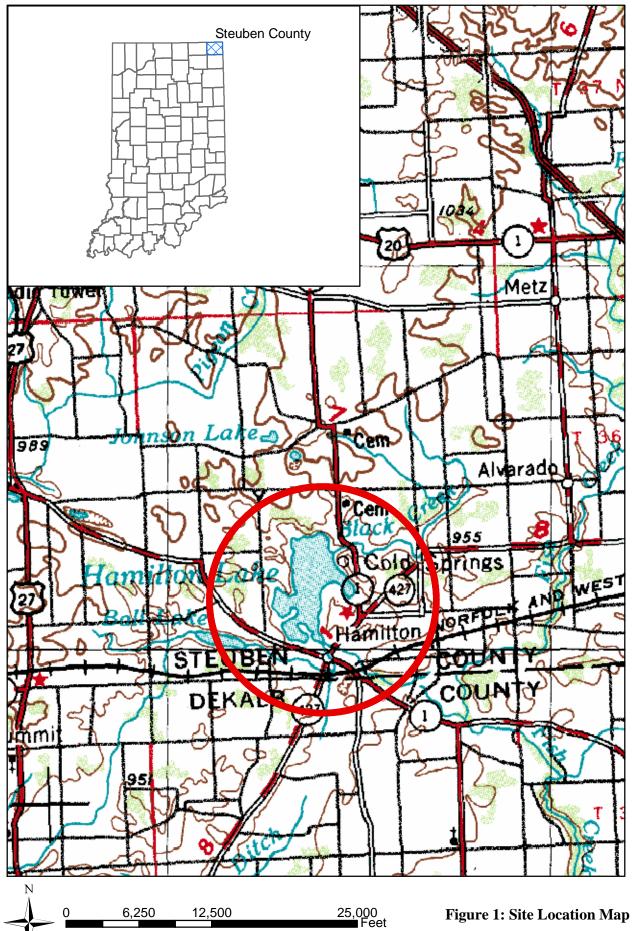
Harza Engineering Company, 1990. Lake Enhancement Feasibility Study – Hamilton Lake, Indiana.

Hoosier Riverwatch, 2005. Volunteer Stream Monitoring Training Manual.

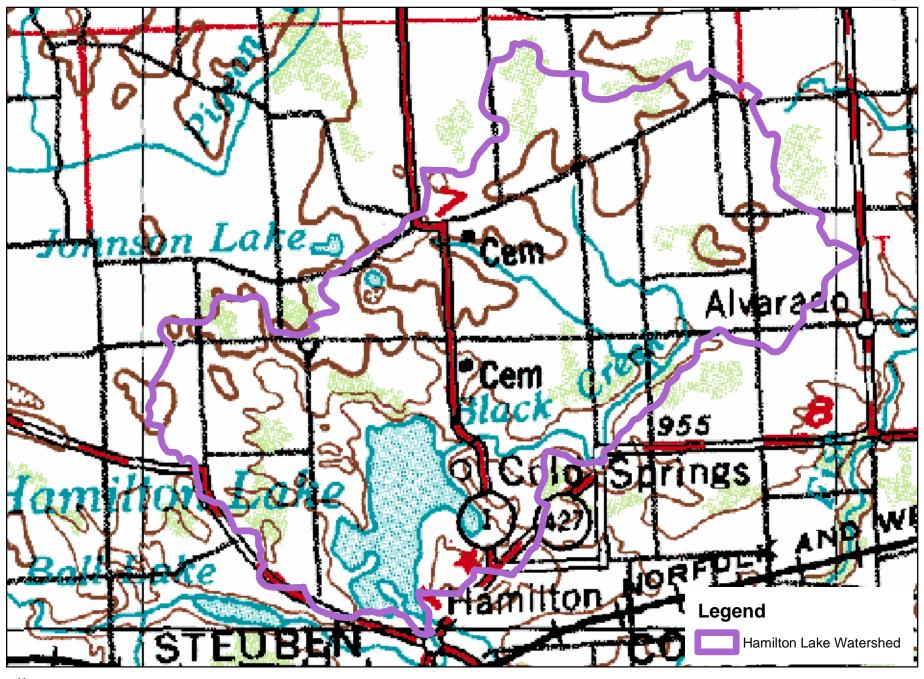
SCS (Soil Conservation Service) of the US Department of Agriculture, 1981. Soil Survey of Steuben County Indiana.

FIGURES









0 3,050 6,100 12,200 Feet

Figure 2: Hamilton Lake Watershed Map



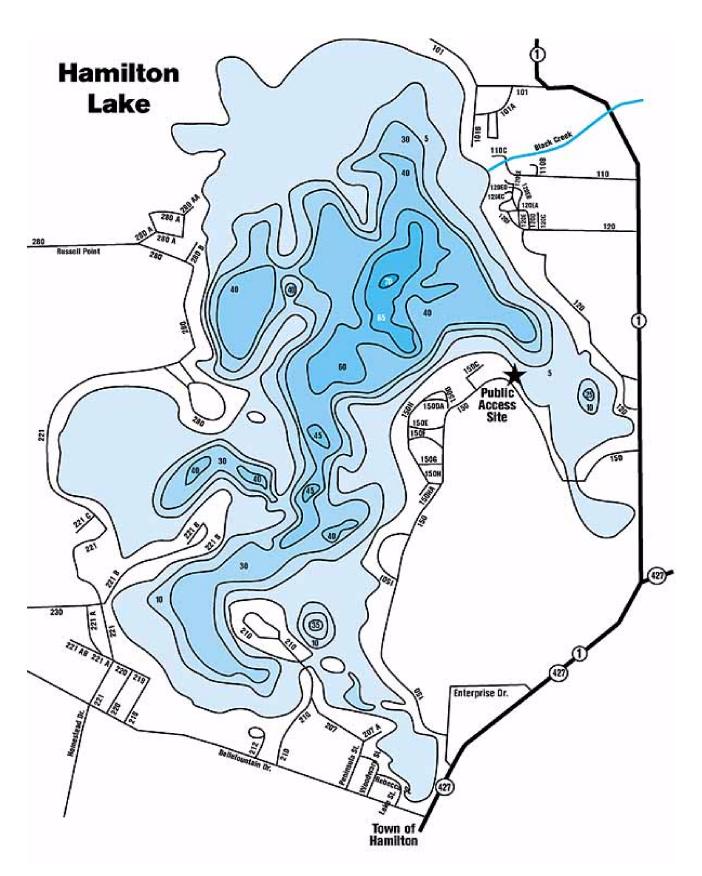




Figure 3: Hamilton Lake Bathymetry



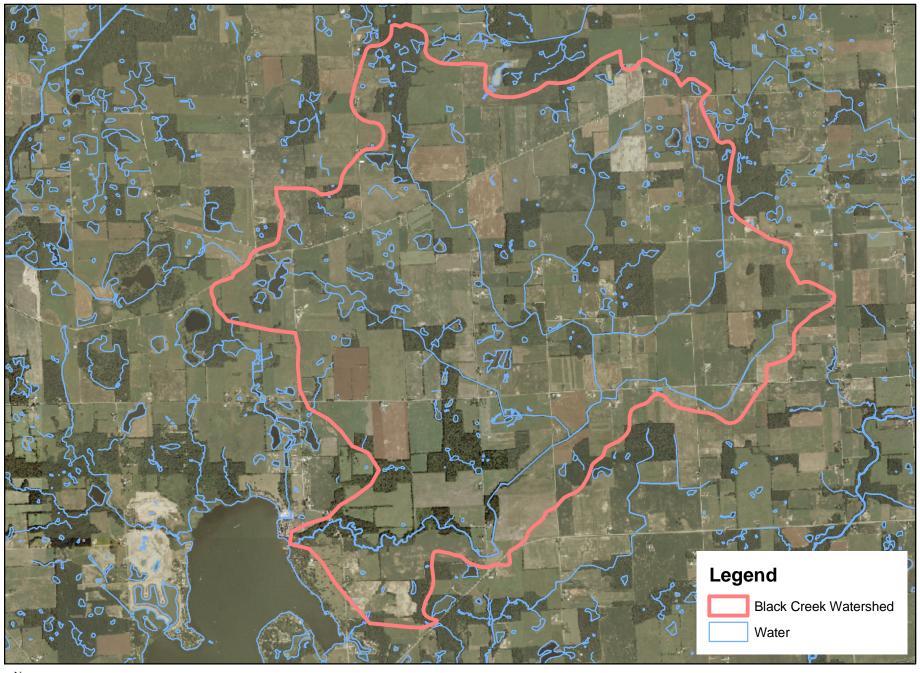




Figure 4: Black Creek Watershed Map



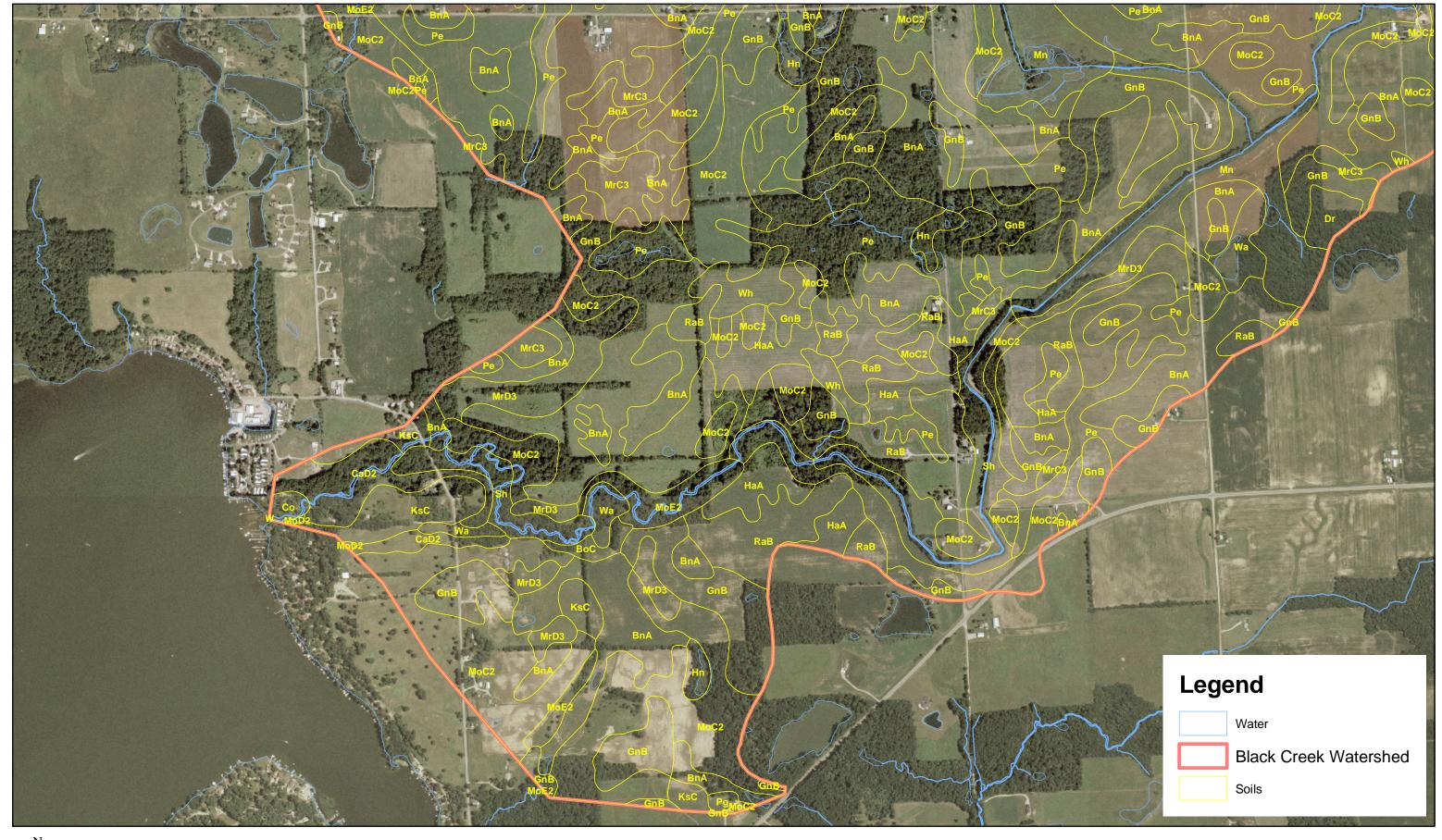
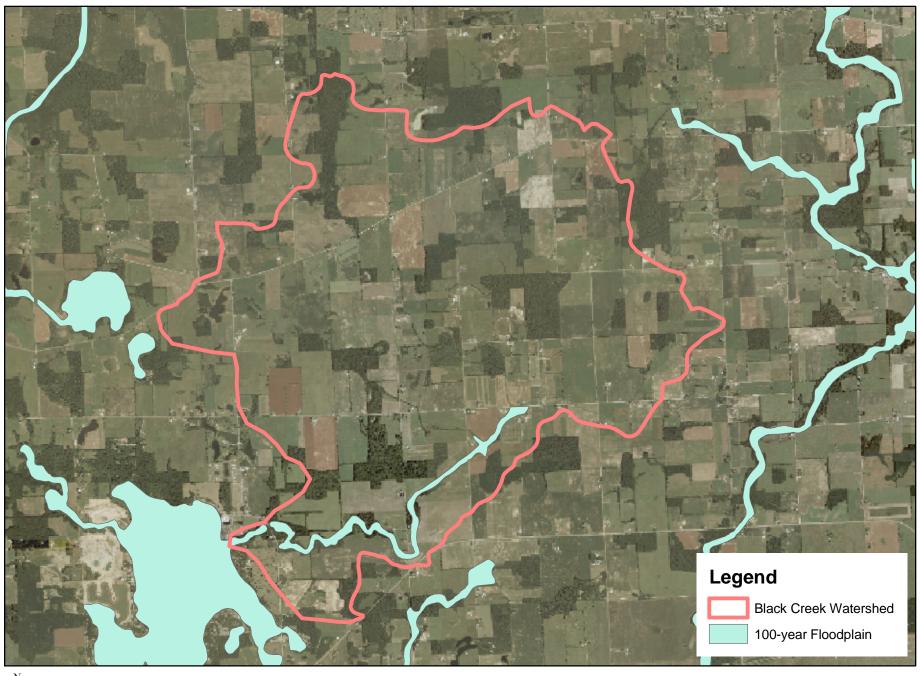




Figure 5: Lower Black Creek Watershed Soils





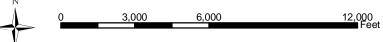
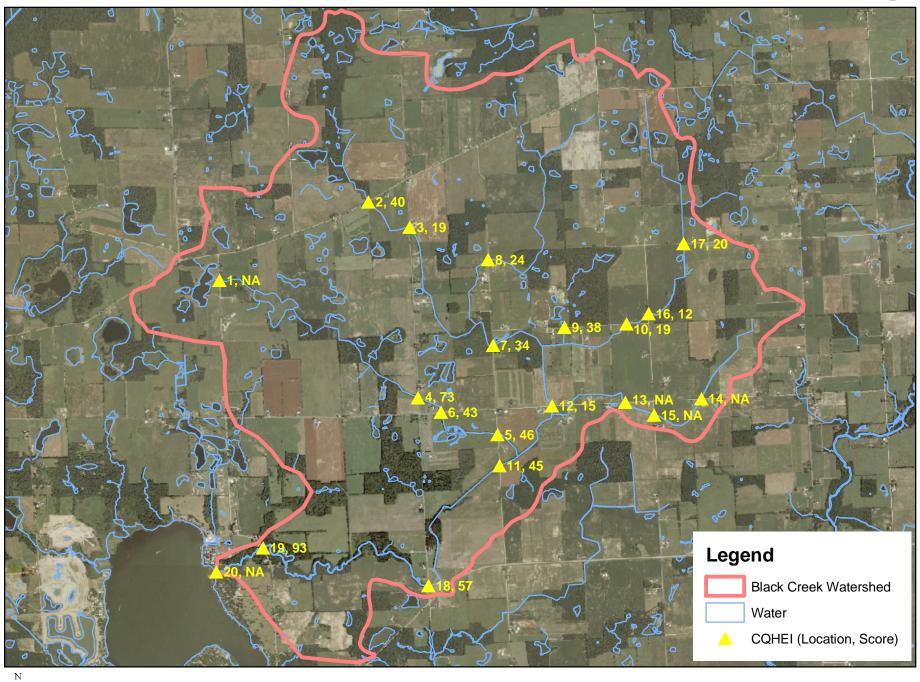


Figure 6: Black Creek 100-year Floodplain Map





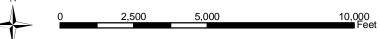


Figure 7: Black Creek CQHEI Scores



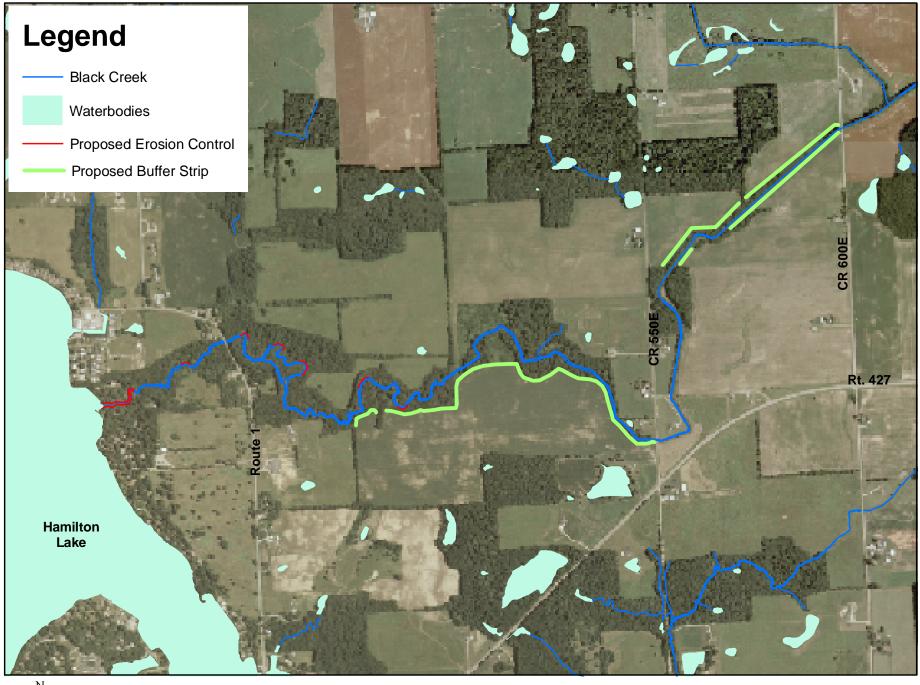
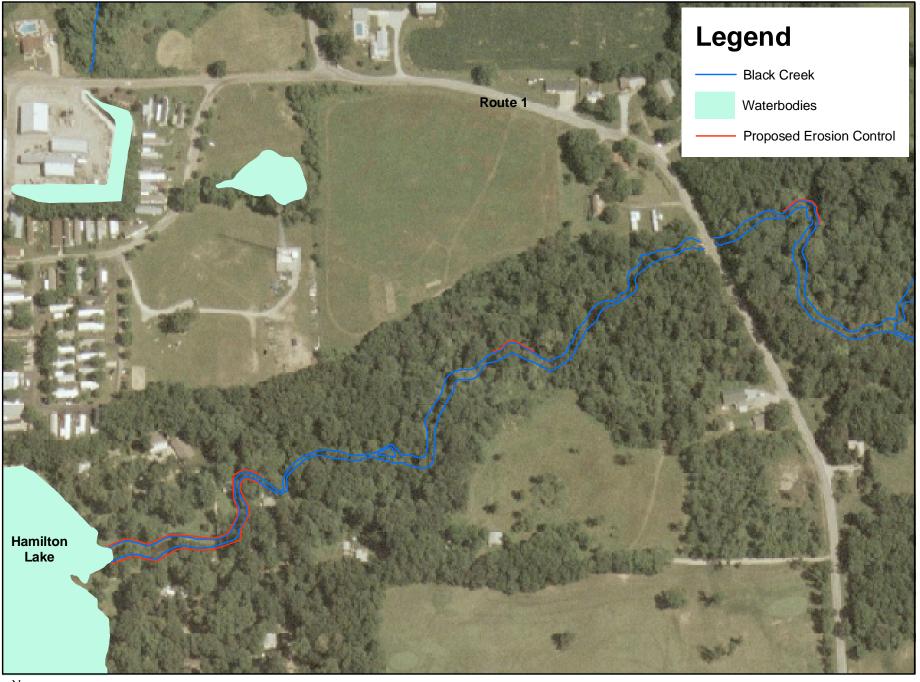




Figure 8: Recommended Water Quality Enhancements Overview Map

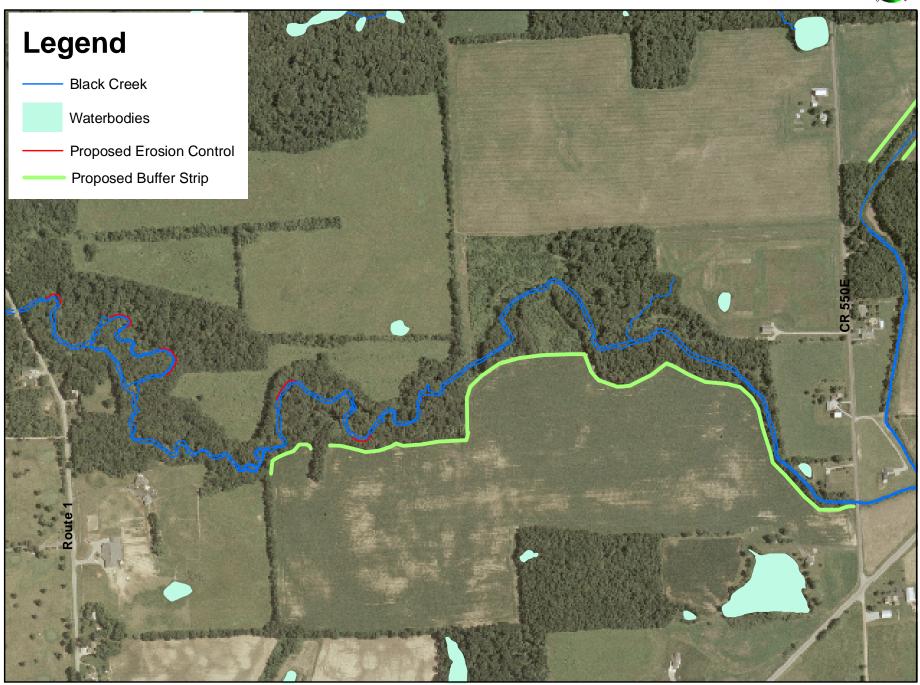




0 150 300 600 Feet

Figure 9: Recommended Water Quality Enhancements Sheet 1





2,000 Feet



Figure 10: Recommended Water Quality Enhancements Sheet 2





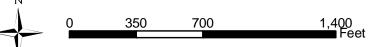


Figure 11: Recommended Water Quality Enhancements Sheet 3



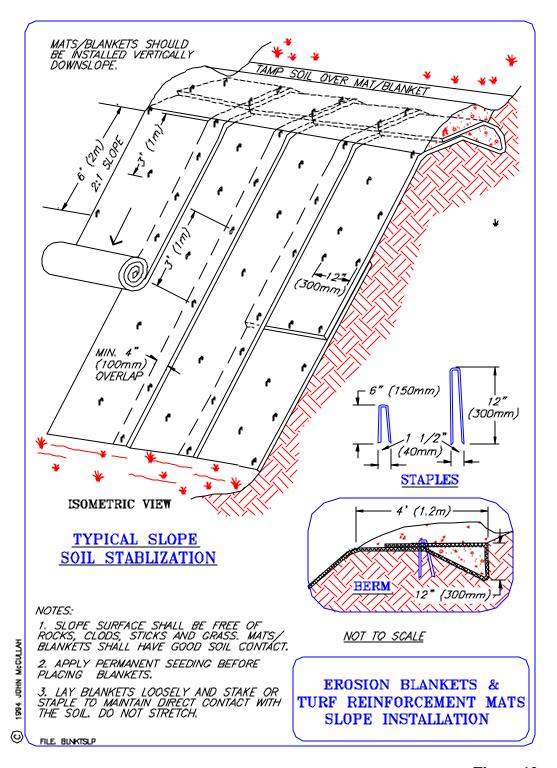


Figure 12 Conceptual Streambank Stabilization Technique Sheet 1



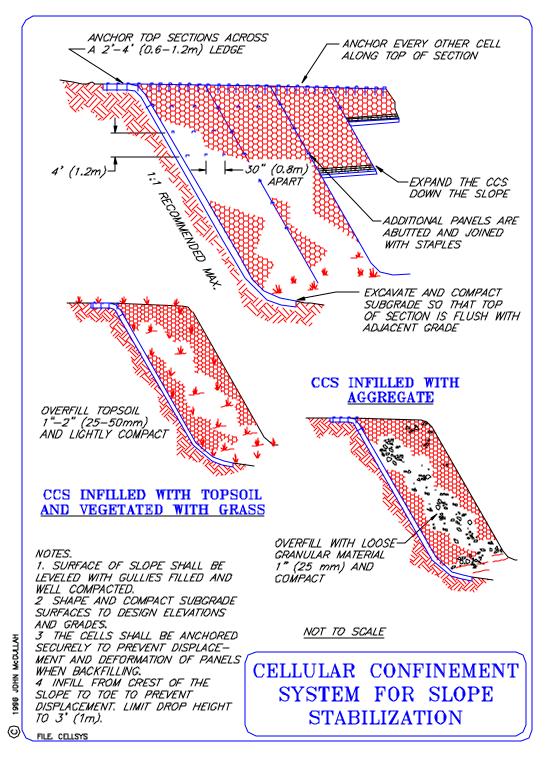


Figure 13 Conceptual Streambank Stabilization Technique Sheet 2



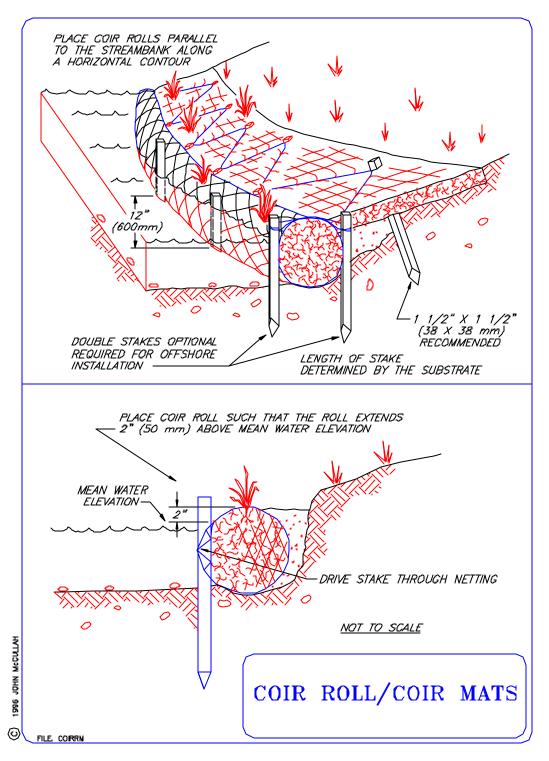


Figure 14 Conceptual Streambank Stabilization Technique Sheet 3



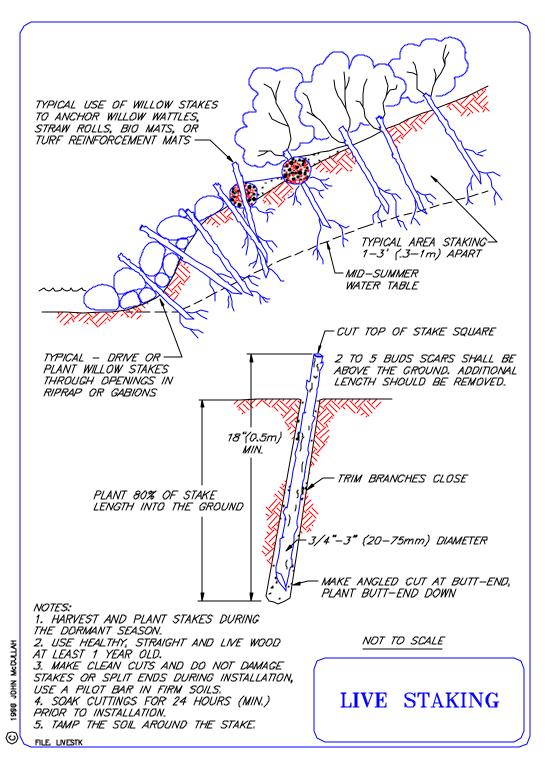
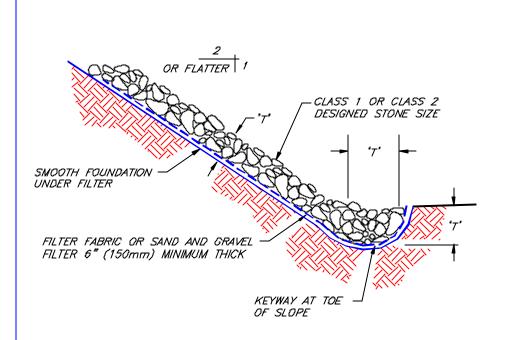


Figure 15 Conceptual Streambank Stabilization Technique Sheet 4





TYPICAL SECTION

NOTE: 'T' = THICKNESS, THICKNESS SHALL BE DETERMINED BY THE ENGINEER. MINIMUM THICKNESS SHALL BE 1.5x THE MAXIMUM STONE DIAMETER, NEVER LESS THAN 6" (150mm)

> **RIPRAP PROTECTION**

1994 JOHN MCCULLAH

FILE. RIPRAP

Figure 16 Conceptual Streambank Stabilization Technique **Sheet 5**



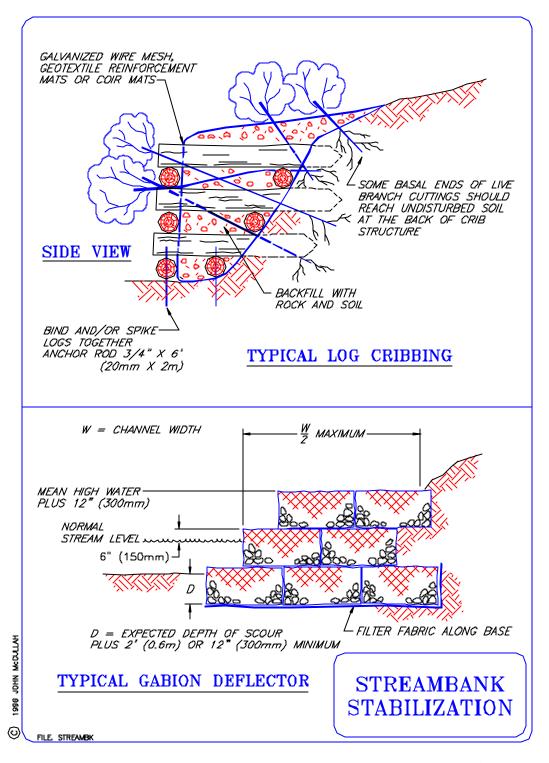


Figure 17 Conceptual Streambank Stabilization Technique Sheet 6



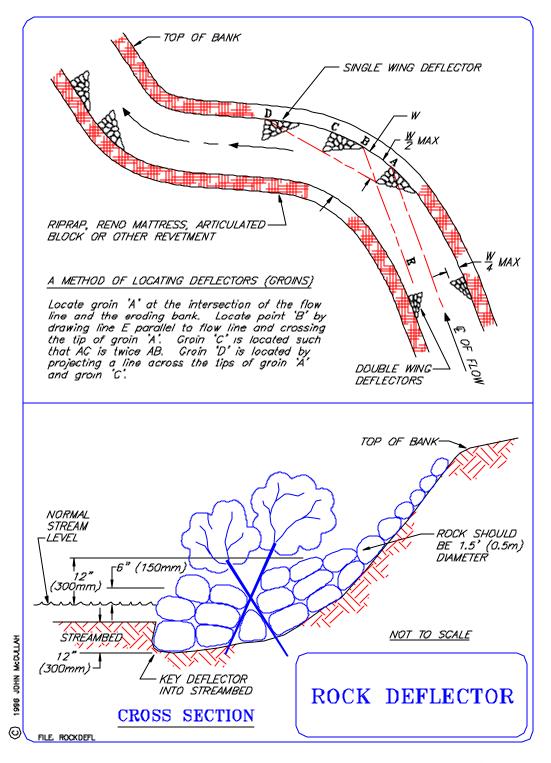


Figure 18 Conceptual Streambank Stabilization Technique Sheet 7



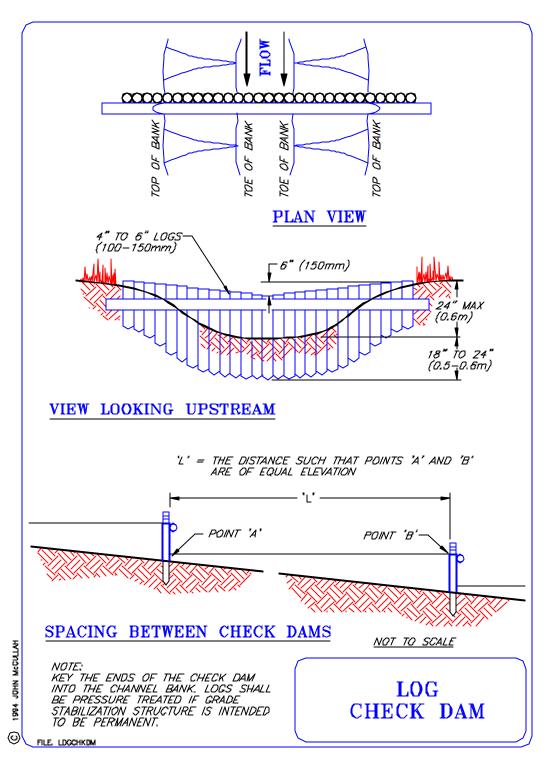


Figure 19 Conceptual Stream Grade Control Technique Sheet 1



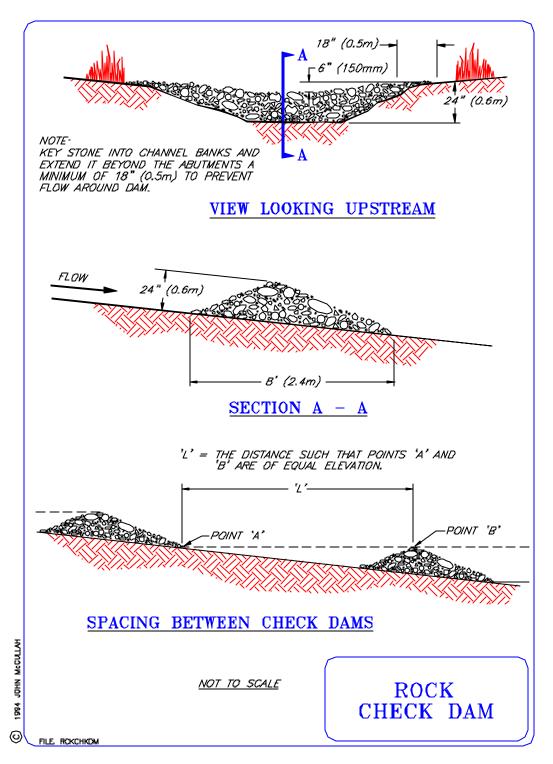
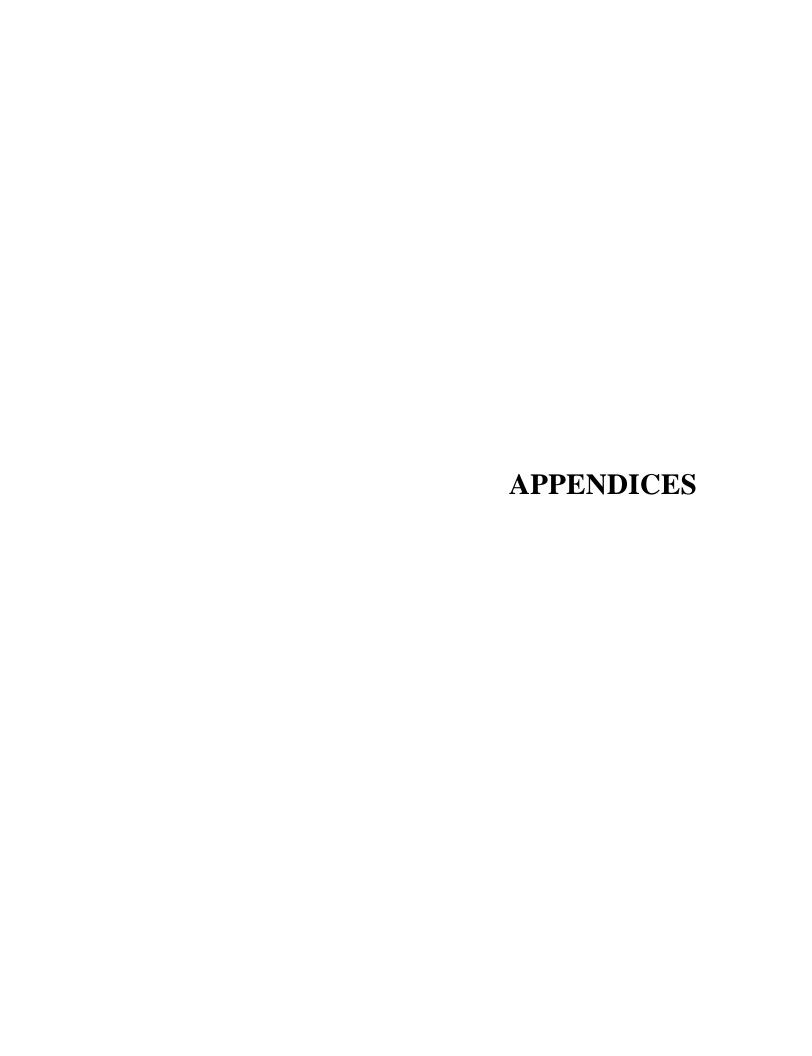
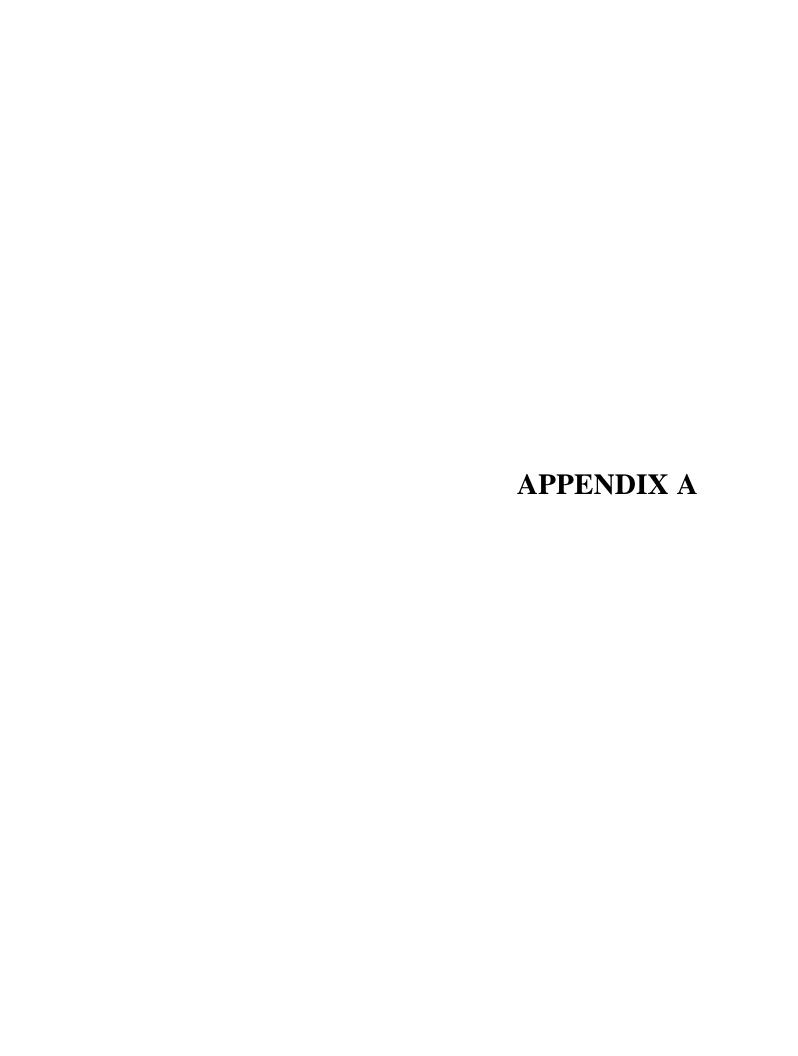


Figure 20 Conceptual Stream Grade Control Technique Sheet 2





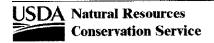
Steuben County, Indiana

Map unit: Co - Cohoctah sandy loam

Component: Cohoctah

Text kind/Category: Nontechnical description/GENSOIL.

The Cohoctah component makes up 100 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood plains. The parent material consists of loamy alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is frequently flooded. It is frequently ponded. A seasonal zone of water saturation is at 3 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 3w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 10 percent.



Steuben County, Indiana

Map unit: CaD2 - Casco gravelly sandy loam, 12 to 18 percent slopes, eroded

Component: Casco

Text kInd/Category: Nontechnical description/GENSOIL

The Casco component makes up 100 percent of the map unit. Slopes are 12 to 18 percent. This component is on outwash plains. The parent material consists of loamy outwash over sandy and gravelly outwash. Depth to a root restrictive layer, strongly contrasting textural stratification, is 10 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very low. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 40 percent.



This report shows only the major soils in each map unit. Others may exist.

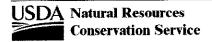
Steuben County, Indiana

Map unit: KsC - Kosciusko gravelly sandy loam, 6 to 12 percent slopes

Component: Kosciusko

Text kind/Category: Nontechnical description/GENSOIL

The Kosciusko component makes up 100 percent of the map unit. Slopes are 6 to 12 percent. This component is on outwash plains. The parent material consists of gravelly loamy outwash over sandy and gravelly outwash. Depth to a root restrictive layer, strongly contrasting textural stratification, is 24 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 30 percent.



Steuben County, Indiana

Map unit: BnA - Blount silt loam, 0 to 3 percent slopes

Component: Blount

Text kind/Category: Nontechnical description/GENSOIL

The Blount component makes up 90 percent of the map unit. Slopes are 0 to 3 percent. This component is on till plains. The parent material consists of loess over clayey till. Depth to a root restrictive layer, densic material, is 30 to 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is low. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 15 inches during January, February, March, April, December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 28 percent.

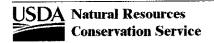
Steuben County, Indiana

Map unit: Sh - Shoals loam

Component: Shoals

Text kind/Category: Nontechnical description/GENSOIL

The Shoals component makes up 90 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood plains. The parent material consists of loamy alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 15 inches during January, February, March, April, December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 15 percent.



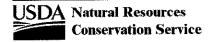
Steuben County, Indiana

Map unit: Wa - Wallkill silt loam

Component: Wallkill

Text kind/Category: Nontechnical description/GENSOIL

The Wallkill component makes up 100 percent of the map unit. Slopes are 0 to 2 percent. This component is on depressions on till plains. The parent material consists of loamy slope alluvium over herbaceous organic material. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very high. Shrink-swell potential is low. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at 3 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 2 percent. Nonimigated land capability classification is 3w. This soil meets hydric criteria.



This report shows only the major soils in each map unit. Others may exist.

Steuben County, Indiana

Map unit: MoE2 - Morley silt loam, 18 to 25 percent slopes, eroded

Component: Morley

Text kind/Category: Nontechnical description/GENSOIL

The Morley component makes up 100 percent of the map unit. Slopes are 18 to 25 percent. This component is on till plains. The parent material consists of loess over clayey till. Depth to a root restrictive layer, densic material, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is low. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 28 percent.

Steuben County, Indiana

Map unit: MoC2 - Morley silt loam, 6 to 12 percent slopes, eroded

Component: Morley

Text kind/Category: Nontechnical description/GENSOIL

The Morley component makes up 100 percent of the map unit. Slopes are 6 to 12 percent. This component is on till plains. The parent material consists of loess over clayey till. Depth to a root restrictive layer, densic material, is 20 to 40 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is low. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 33 inches during January, Ferrary, March, April, December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 28 percent.



This report shows only the major soils in each map unit. Others may exist.

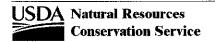
Steuben County, Indiana

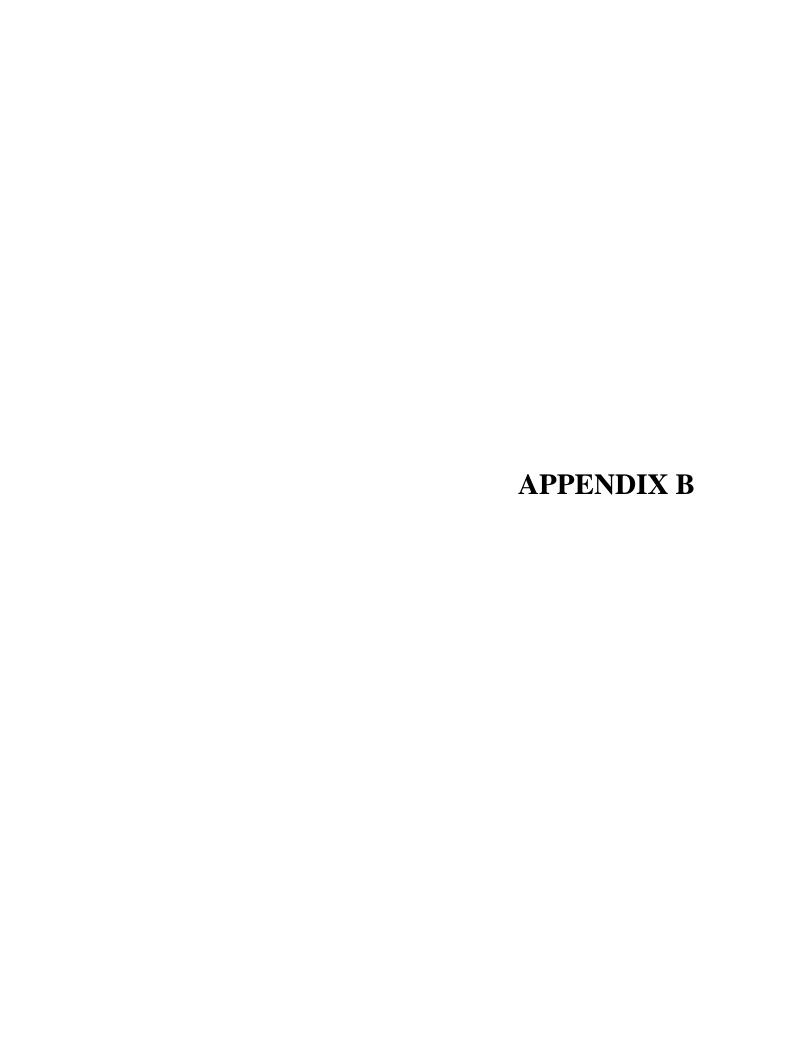
Map unit: Mn - Milford silty clay loam

Component: Milford

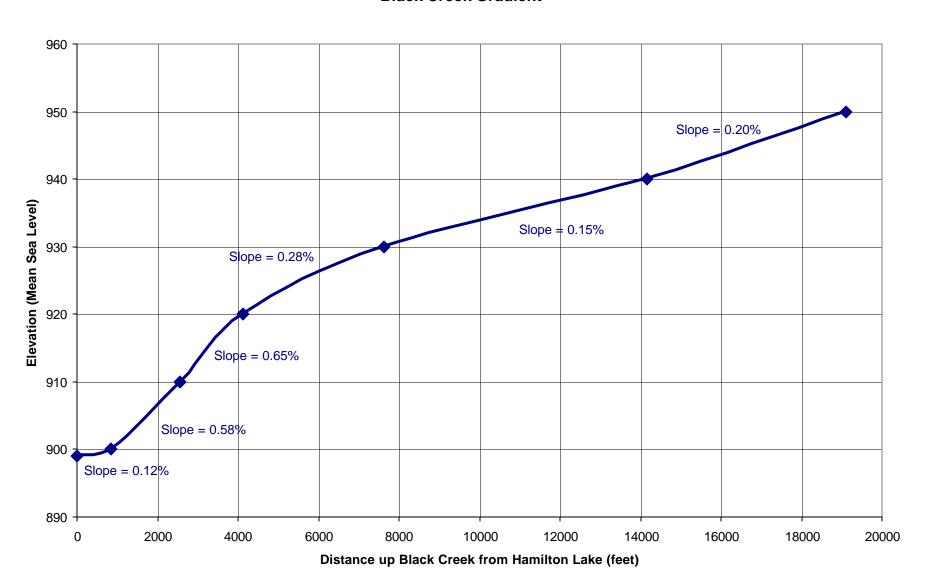
Text kind/Category: Nontechnical description/GENSOIL

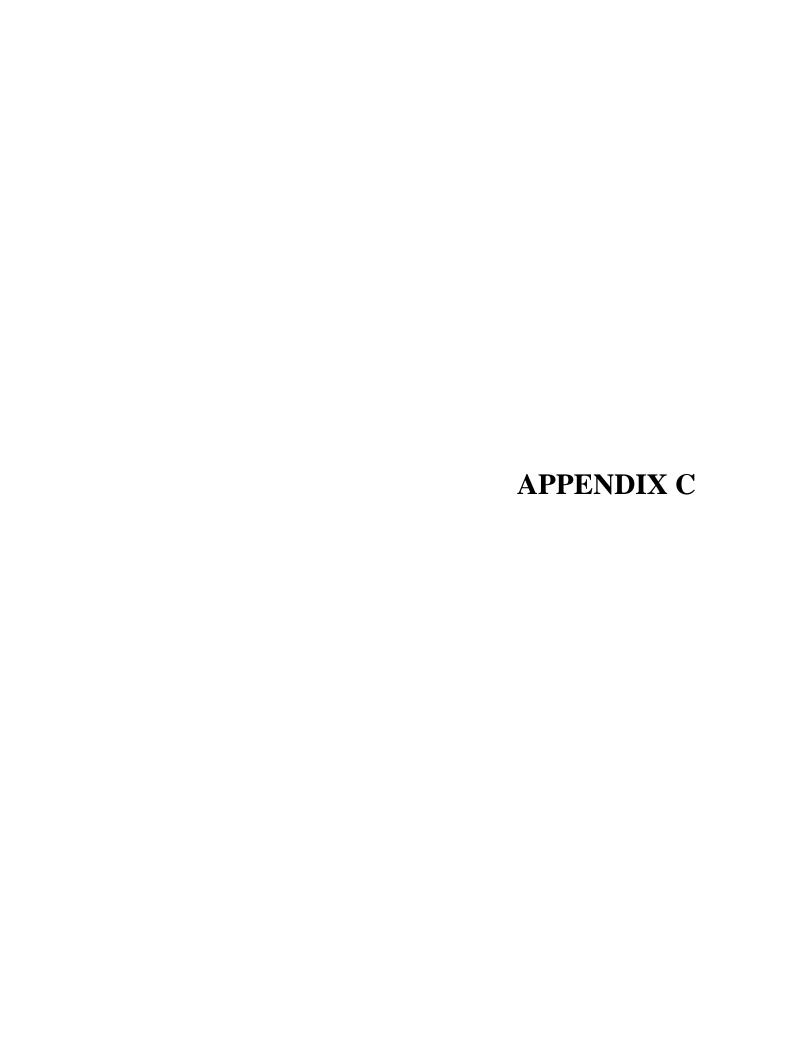
The Milford component makes up 100 percent of the map unit. Slopes are 0 to 2 percent. This component is on depressions on lake plains. The parent material consists of clayey lacustrine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is high. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at 3 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 2w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 10 percent.





Black Creek Gradient







Memorandum

Date: 4/25/06

To: Hamilton Lake Association

Cc: Kent Tracey, LARE

From: Doug Mulvey

RE: Black Creek Technical Memorandum

The following are my observations from the Black Creek watershed reconnaissance performed on April 15, 2006 with members of the Hamilton Lake Association and interested local landowners. The lower section of Black Creek from Hamilton Lake to CR 550E was walked while the remainder of the watershed was reviewed from the roads and other public access sites.

The following attachments are included with this memorandum:

Appendix A – Lower Black Creek Property Owner Maps

Appendix B – Photo Log of the Lower Black Creek Walk

Appendix C – Black Creek Watershed Reconnaissance Photo Log

Appendix D – Recommended Water Quality Enhancement Overview Maps

The following observations were made during reconnaissance of Black Creek and its watershed:

Black Creek – Hamilton Lake to Route 1

Reference is made to Appendix A and B. The section of Black Creek from Hamilton Lake to Route 1 is predominantly a natural high quality section of creek. There are many riffles, runs, and pools as one moves away from Hamilton Lake towards Route 1. In general, this entire section of stream is surrounded by a high quality wooded floodplain. At the discharge of Black Creek into Hamilton Lake these is evidence of an extensive delta of sediment that has built up through the years. This delta of sediment prevent boat access by property owners in this area and prevents access of fish to Black Creek during dryer months. The sediment has likely flushed into the lake during high flow events leadings to sediment plumes documented by local landowners. Locals have identified the flood of 1996 as a major source of sediment and damage in the watershed.

Just upstream of the Black Creek, along the Kreinbrink, Spence, Lusch, and Byers properties, there is evidence of significant streambank erosion. This includes about 500 feet of streambank;



however, approximately 100 feet of this has been adequately protected on the Kreinbrink property with rip-rap. Some of the other properties along this stretch of stream have placed stones and large chunks of concrete along the Black Creek streambanks; however, this material is beginning to erode away and not provide the desired level of protection. A vegetated and/or hard armor streambank erosion protection technique is recommended. Sheet 1 in Appendix D details the locations of the proposed improvements.

Farther upstream, near Route 1, is the only other area of significant streambank erosion that was identified in this stretch of Black Creek. This site is on the John Surfus property and is identified in Picture 12 (Appendix B) and location 12 on the Photo Log Location Map – Lower Black Creek – Sheet 1 (Appendix B). If funds are available, this section of stream (approximately 150 feet of the north bank) should be stabilized through vegetative and hard armoring techniques. Sheet 1 in Appendix D details the locations of the proposed improvements.

Black Creek – Route 1 to CR 550E

Black Creek meanders through this large floodplain forest. A majority of the stream is on property owned by Cold Springs Inc. All or almost all of this property relatively close to Black Creek is in the floodplain forest or is in set-aside acreage in the Conservation Reserve Program (CRP); therefore, the erosion and sediment coming from Cold Springs Inc. property is minimal. However, along Black Creek there are some major streambank bluffs. Some of these areas were historically hard armored by the early farmers. When cleaning the fields, the farmers would place the boulders along the stream bank. This practice is evident in a number of locations in this stretch of the stream and it has done a good job of protecting the streambanks in these locations.

Areas to consider for streambank erosion control include those shown in Pictures 14, 15, 18, 22, and 23 (Appendix B). These areas are either located along steep stream bluffs or they are located where the stream does 90 degree or "hairpin" turns. These three discrete locations are located in sections of Black Creek owned by Cold Springs Inc. A small section of Black Creek (Picture 20) shows some erosion along the stream bluff; however, the property owner (Richard Friend) asks that nothing be performed on his property. Sheet 2 in Appendix D details the locations of improvements proposed above.

As one progresses along this stretch of stream, agricultural row crop fields owned by Charles Howard are located close to Black Creek (Appendix A, Sheets 3 through 6). Given the fields' proximity to Black Creek, a grass buffer strip is recommended for large portions of this property where it borders Black Creek. Sheet 2 in Appendix D details the locations where this option should be considered. It is recommended that the local NRCS office work with this landowner to determine whether this would be an acceptable conservation practice.

Black Creek – CR 550E and the rest of the watershed

After passing east of CR 550E, the Black Creek watershed predominantly discharges through agricultural row crop fields, pastures, and CRP set-aside acreage. Instead of densely vegetated



forested floodplains, the area around Black Creek and its tributaries is typically small forested and/or grass buffer strips or no buffer strips at all. Large tracts of forested floodplain are rare. Appendix C provides many pictures of these locations through out the remainder of the watershed.

Most of these sections of the watershed are ditches maintained by the county surveyor. In general, the vast majority of these ditches have stable streambanks and large areas of erosion are not evident. Also, many of these areas have either natural buffers (trees, pastures, or lawns) or Natural Resource Conservation Service support practices (buffer strips and CRP set-aside lands). Therefore, areas of mass erosion and erosion potential are not evident. However, given the fair amount of agricultural activities in these upper reaches of the Black Creek watershed, one can expect some degree of erosion and sediment discharge from these agricultural fields. This is evident in some of the upper levels of Black Creek and its tributaries in that sediment is prevalent in the streambed and in many places covers the stream substrate (rocks, stones, and pebbles). However, large areas of gully and rill erosion were not noted in the watershed.

Measures to reduce erosion from the agricultural fields are already being implemented to a great extent. These practices such as buffer strips, CRP set-aside, and no-till or minimal till practices should continue to be promoted on a watershed basis by the local NRCS. Although there are a number of locations in the watershed where these practices could be implemented, in particular in the upper sections of the watershed), we have noted a few closer to Hamilton Lake that should be of priority. Sheets 2 and 3 in Appendix D details the locations where, in our opinion, efforts should be concentrated.

Summary and Recommendations

The above sections present our observations of the watershed and sediment loads from the watershed. Specific locations to enhance water quality have been presented above. The remainder of this study will concentrate on making specific recommendations for the areas proposed for improvement identified above.

Sediment deposition at the Black Creek discharge into Hamilton Lake is evident and is documented by many of the local residents. This deposition causes the following problems and impairments:

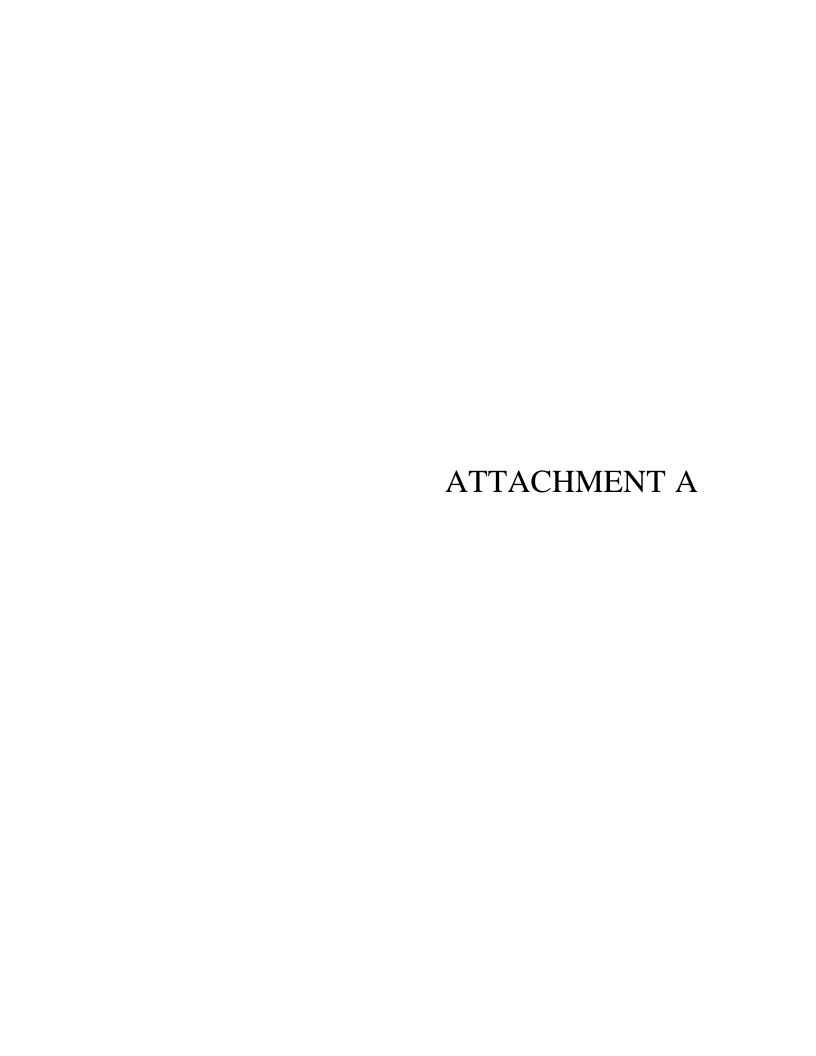
- 1. Local residents can not access the lake without extending their docks
- 2. During many months of the year, fish and other aquatic species can not access Black Creek as they historically could
- 3. Sediment plumes in this area lead to an aesthetically unpleasing environment

In this Memorandum, we have identified measures, which will reduce new sediment loads to the lake. However, none of these measures will address the sediment that has built up at the discharge of Black Creek into Hamilton Lake. Given property owner interest and the interest of the Hamilton Lake Association (HLA) in addressing this sediment build-up, we recommend that

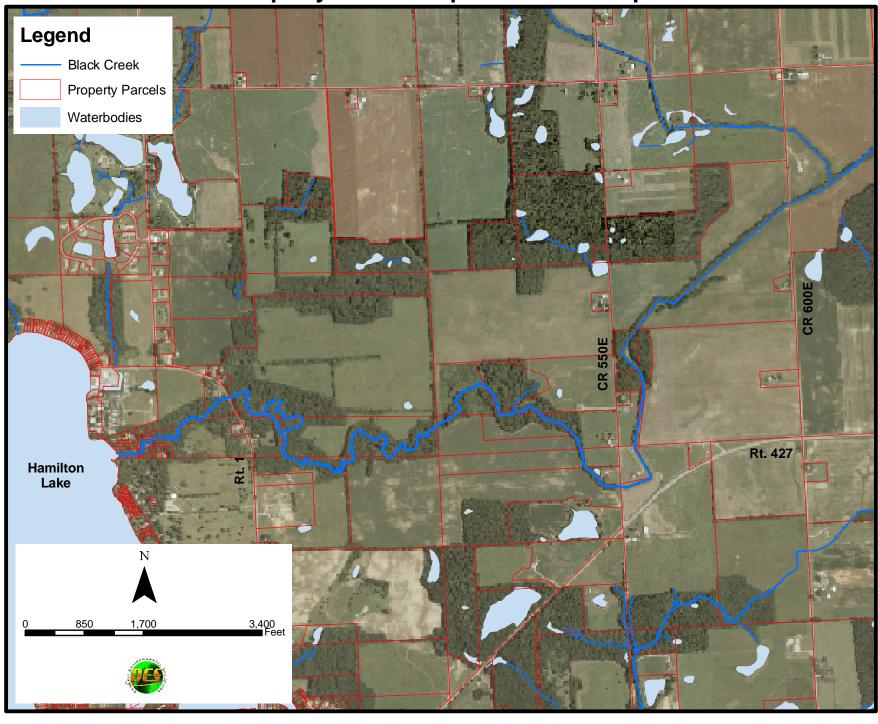




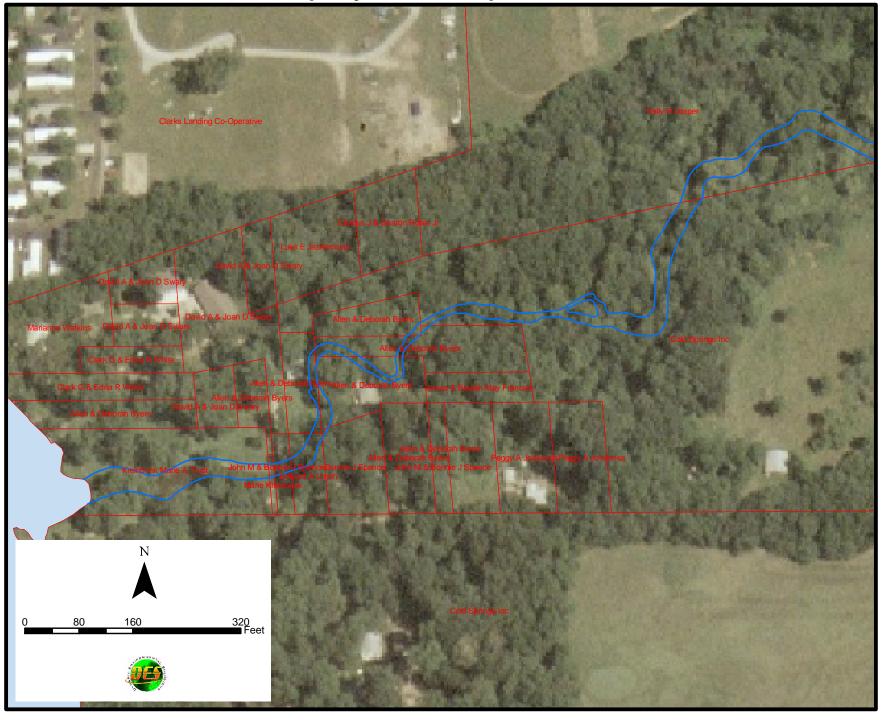
the HLA apply to the Indiana Department of Natural Resources Lake and River Enhancement (LARE) division for funding to perform a Sediment Management Plan or that the HLA utilize existing funding to prepare such a plan in accordance with LARE guidelines. This document is required before the HLA can apply for dredge funding from LARE to remove this sediment deposition.



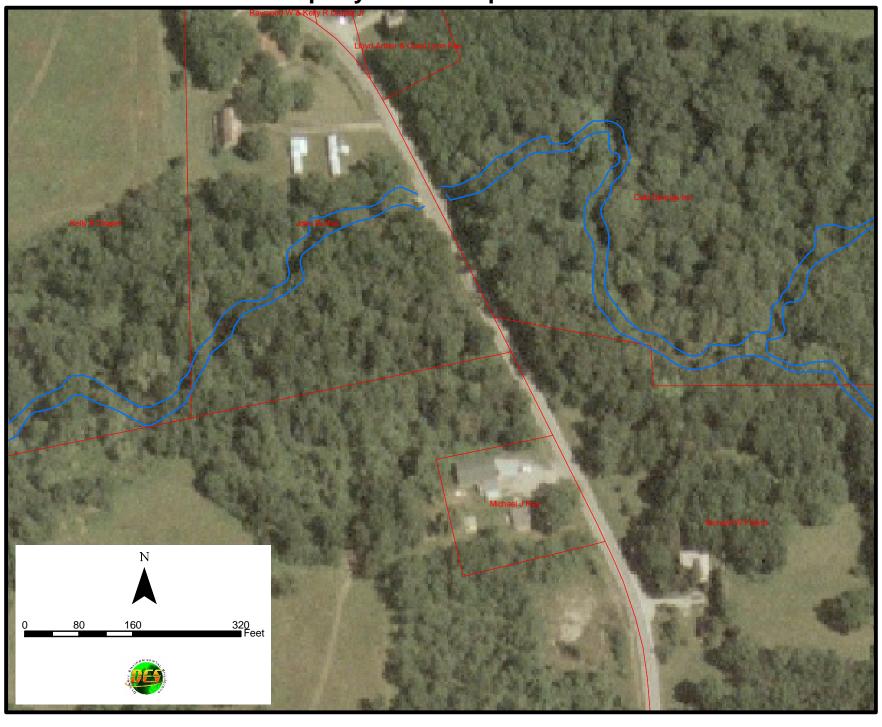
Property Owner Map - Overview Map



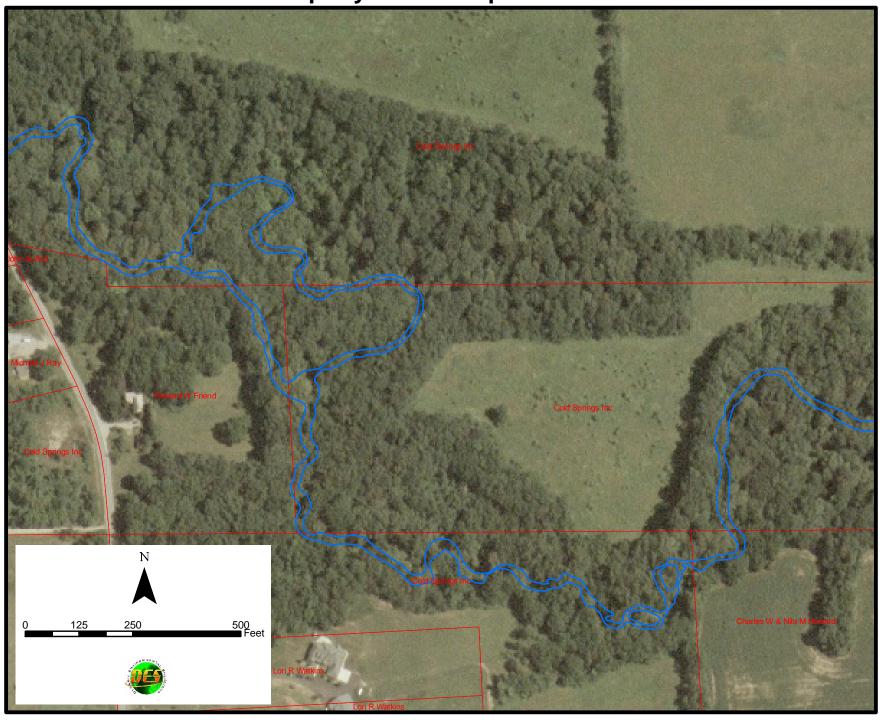
Property Owner Map - Sheet 1



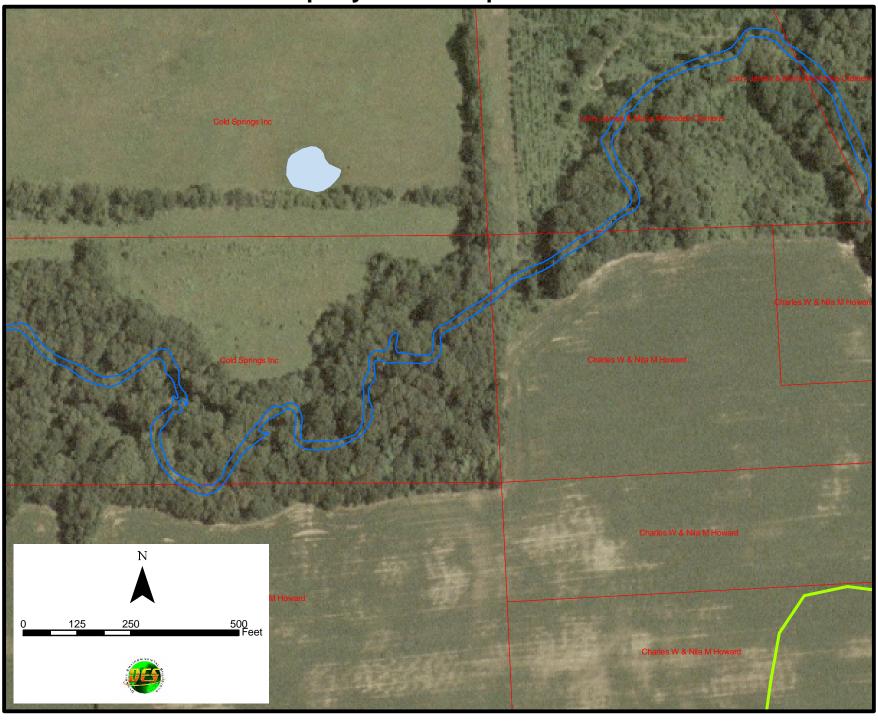
Property Owner Map - Sheet 2



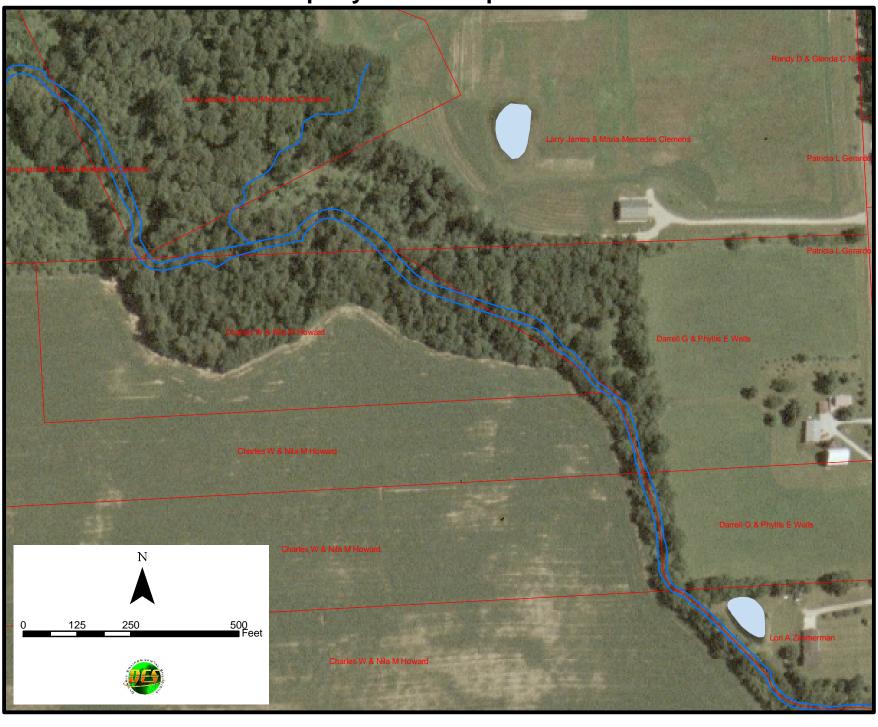
Property Owner Map - Sheet 3



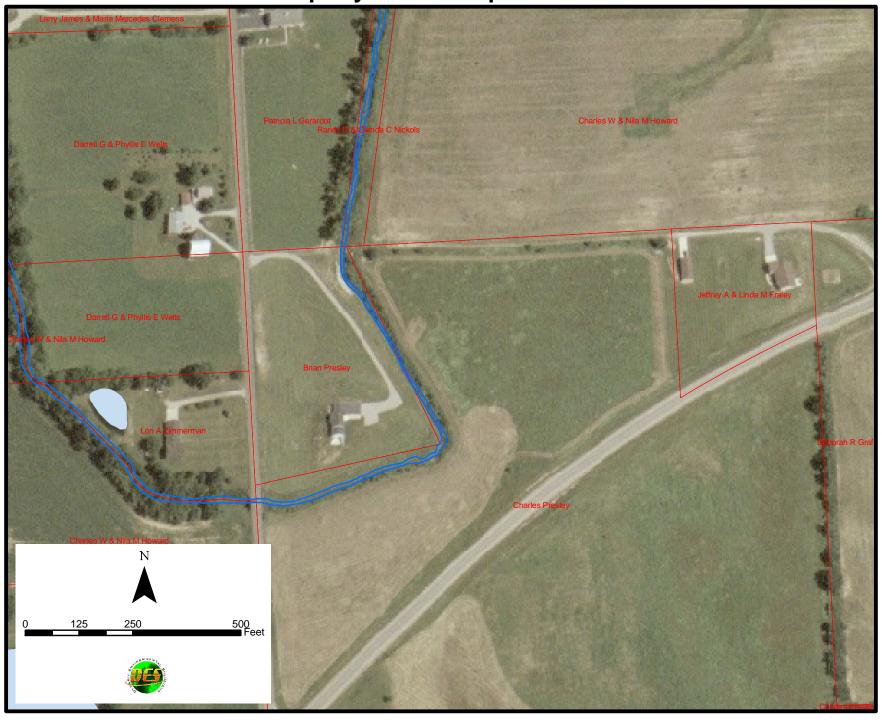
Property Owner Map - Sheet 4



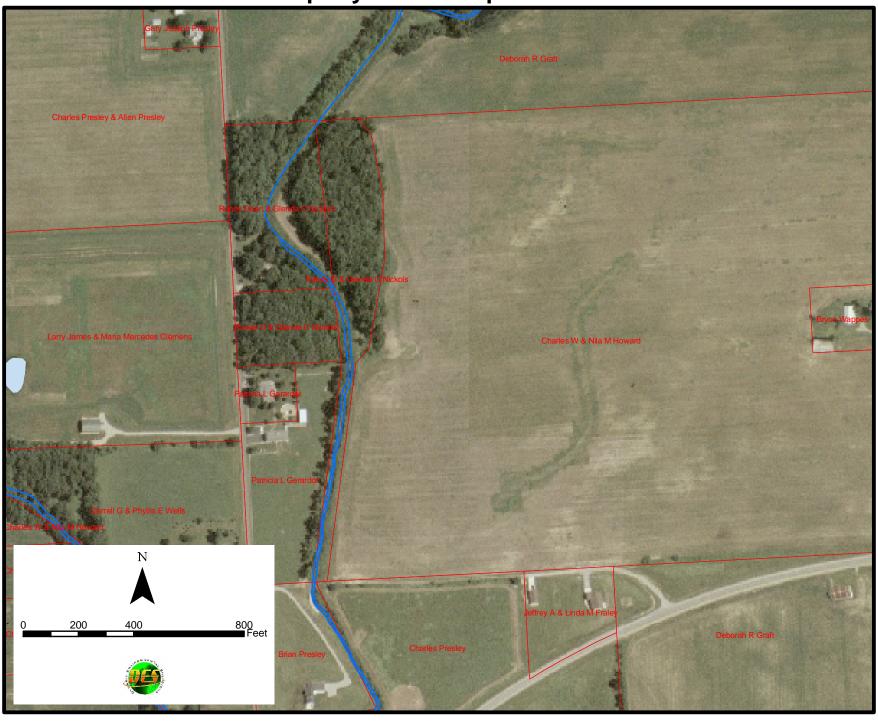
Property Owner Map - Sheet 5



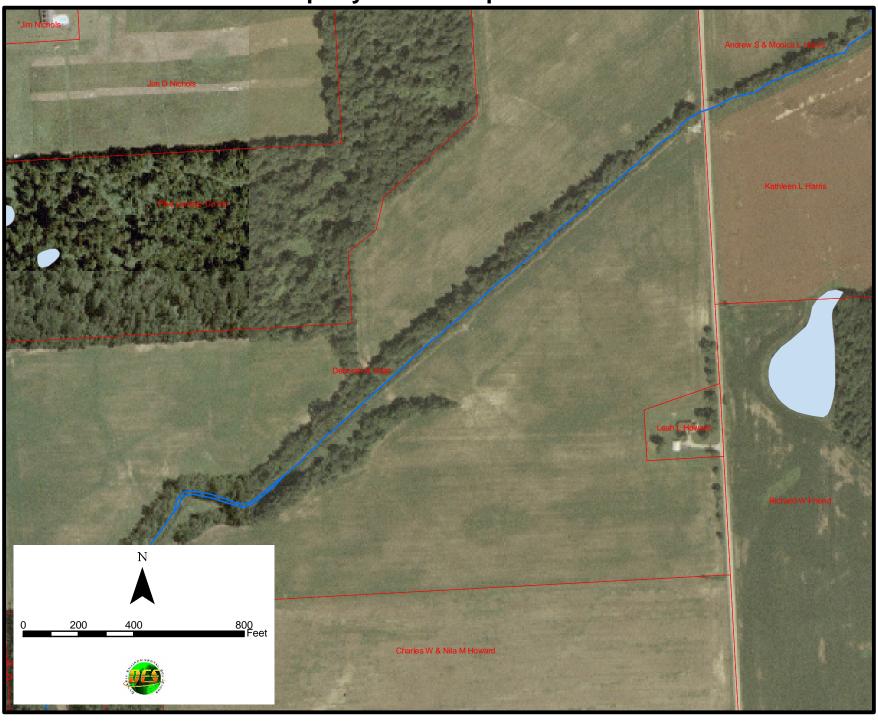
Property Owner Map - Sheet 6



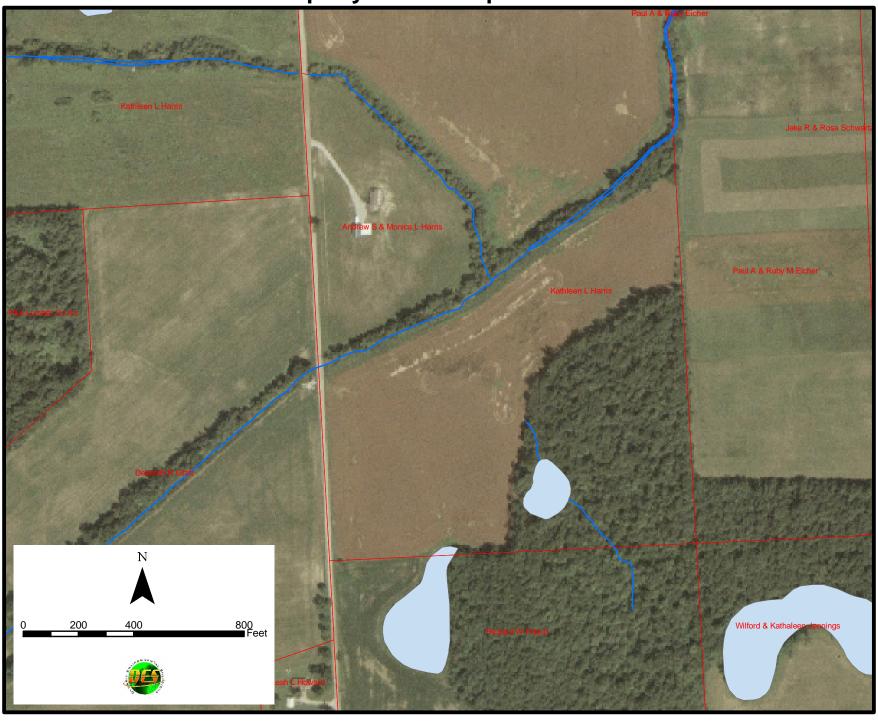
Property Owner Map - Sheet 7



Property Owner Map - Sheet 8



Property Owner Map - Sheet 9



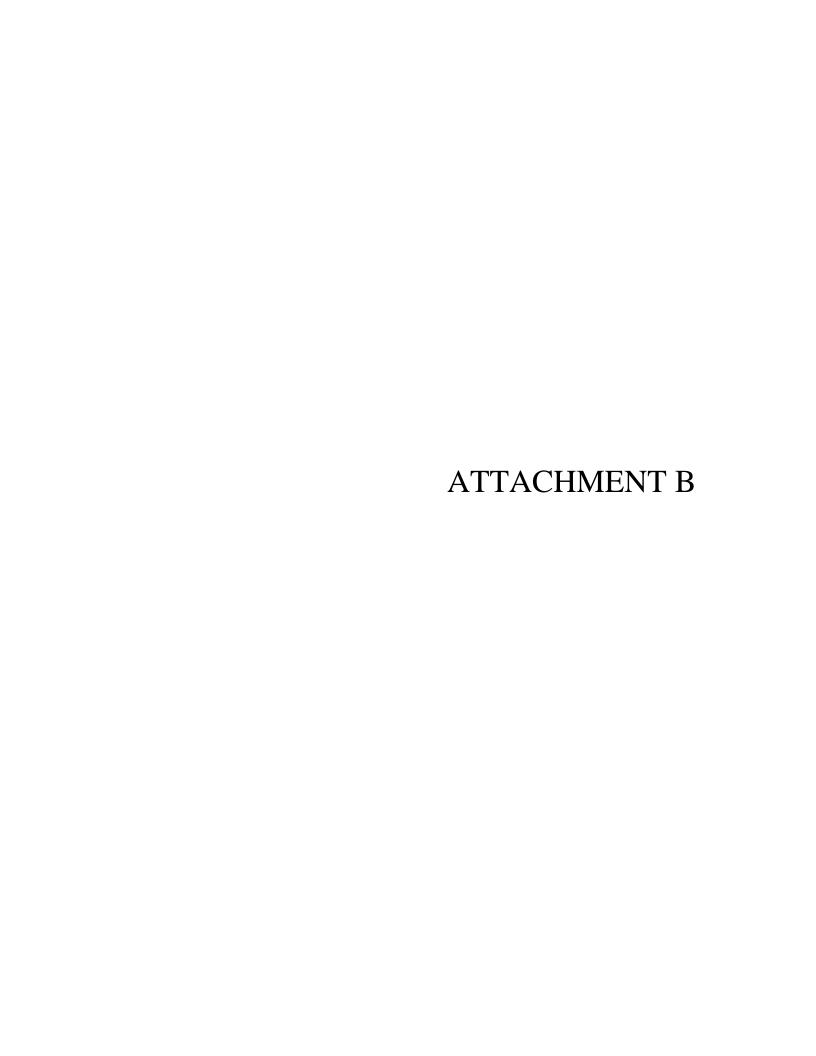


Photo Log Location Map - Lower Black Creek - Overview Map

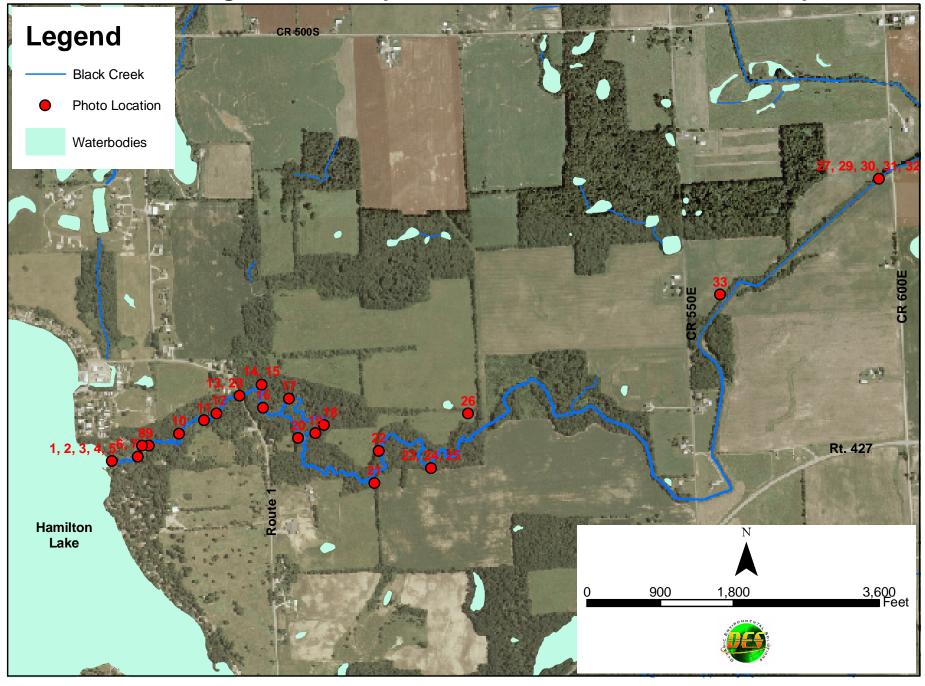


Photo Log Location Map - Lower Black Creek - Sheet 1

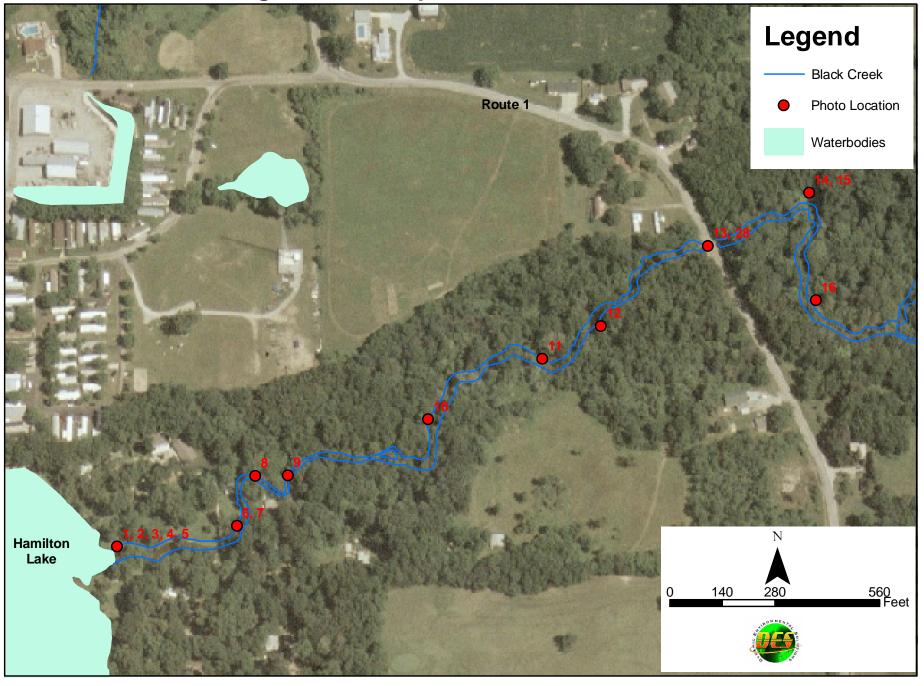


Photo Log Location Map - Lower Black Creek - Sheet 2

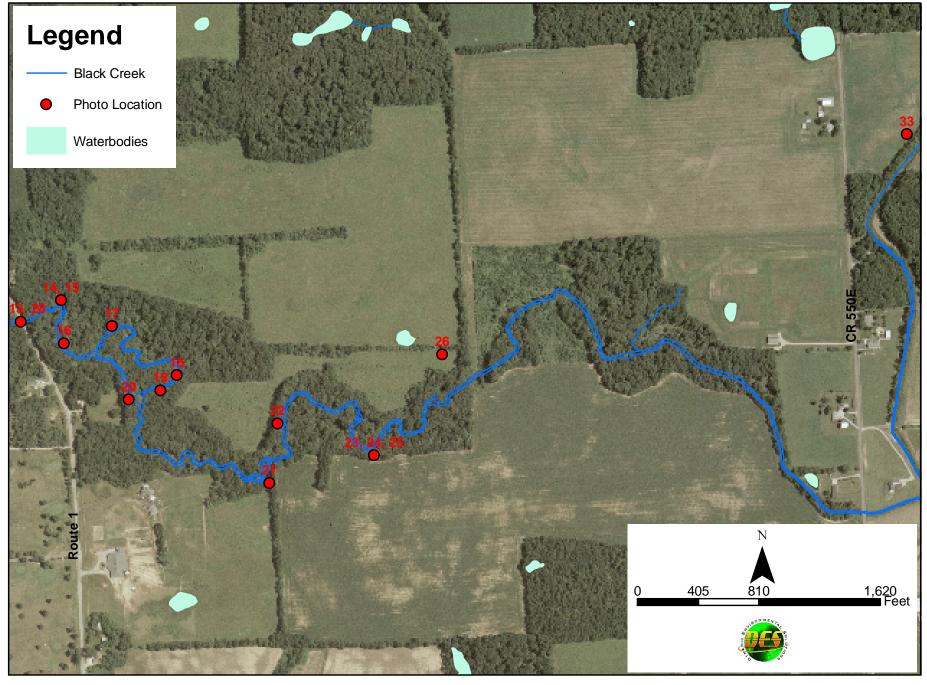
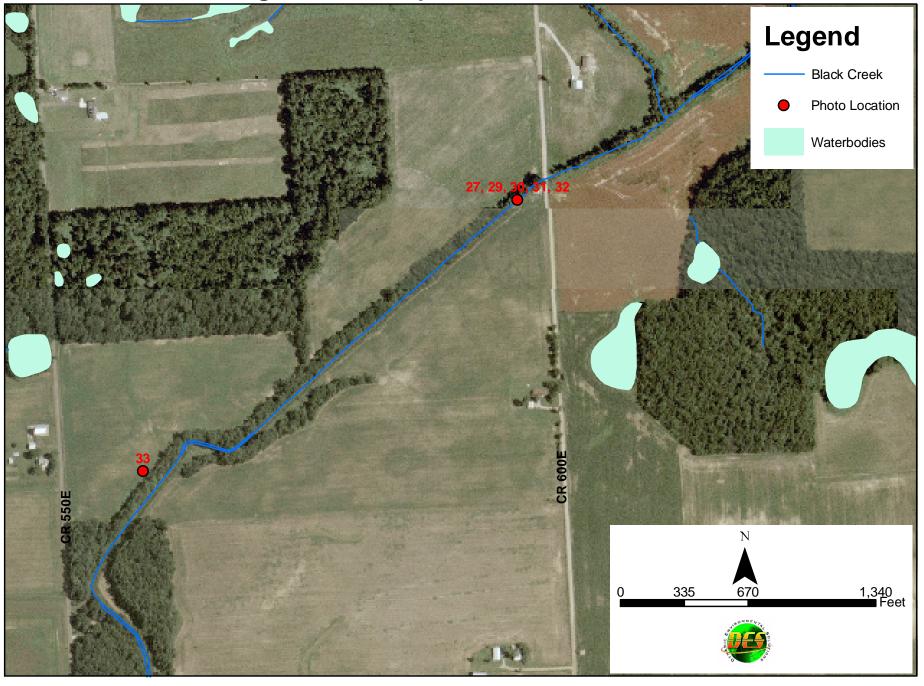


Photo Log Location Map - Lower Black Creek - Sheet 3







Picture 1: Black Creek at Hamilton Lake (Picture taken Northwest)



Picture 2: Black Creek at Hamilton Lake (Picture taken West)





Picture 3: Black Creek at Hamilton Lake (Picture taken Southwest)



Picture 4: Black Creek at Hamilton Lake (Picture taken to East or upstream)





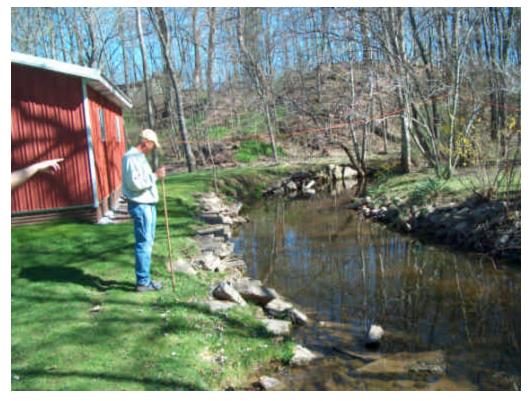
Picture 5: Shoreline erosion and very shallow water from sediment deposition

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Picture 6: Black Creek makes a 90 degree turn on the Lusch property



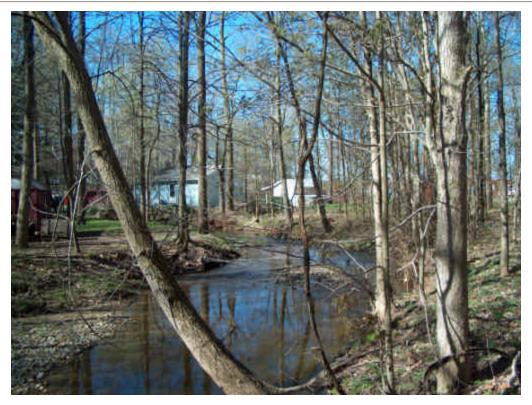
Picture 7: Black Creek makes another 90 degree turn on the Byers property





Picture 8: Tree roots providing streambank erosion protection on the Byers property





Picture 9: Natural pools and riffles in Black Creek on the Byers property



Picture 10: Coarse substrate and pools and riffles along this natural section of Black Creek





Picture 11: Evidence of some coarse sediment deposition



Picture 12: Small stretch of streambank erosion





Picture 13: Looking downstream from the bridge on Route 1



Picture 14: Erosion on "hairpin" bend on the Cold Springs Inc property (upstream view)





Picture 15: Downstream view of Picture 14



Picture 16: Natural pool and riffle area on the Cold Springs Inc property





Picture 17: Tree roots providing erosion protection



Picture 18: Erosion along the "hairpin" bend on the Cold Springs Inc property oxbow





Picture 19: Steep banks along the oxbow



Picture 20: Steep and eroding banks on the Friend property





Picture 21: Tree roots stabilizing banks on Cold Springs Inc property



Picture 22: Steep bluffs on 90 degree bend on Cold Springs Inc property

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Picture 23: Slight bluff erosion on Cold Springs Inc property



Picture 24: Howard property fields outside of the Black Creek floodplain





Picture 25: Drainage from Howard fields down bluff into Black Creek





Picture 26: Typical buffer on Cold Springs Inc. property outside of the forested floodplain



Picture 27: Graft property next to Black Creek





Picture 28: Typical water quality photo of Black Creek upstream of Route 1





Picture 29: Field drainage of Graft property into Black Creek



Picture 30: Same as Picture 29





Picture 31: Black Creek segment through the Graft property

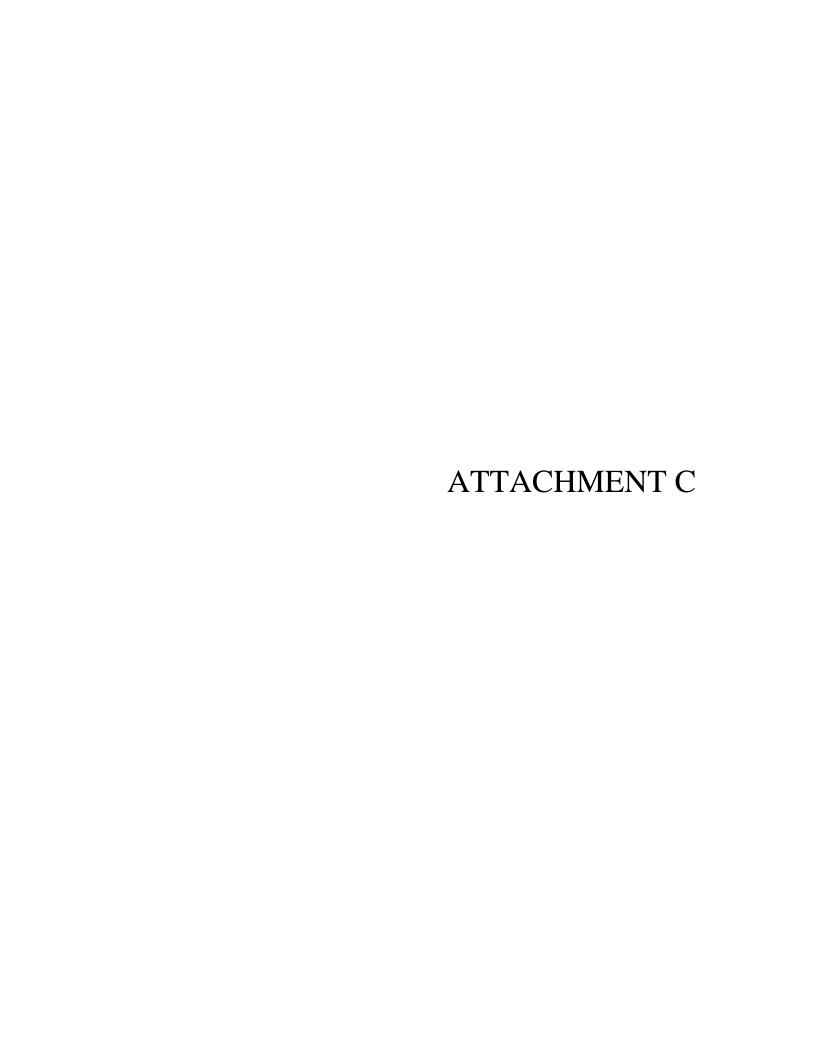


Picture 32: Same as Picture 31





Picture 33: Field drainage through berm and standpipe into Black Creek on Graft property



Watershed Photo Log Location Map

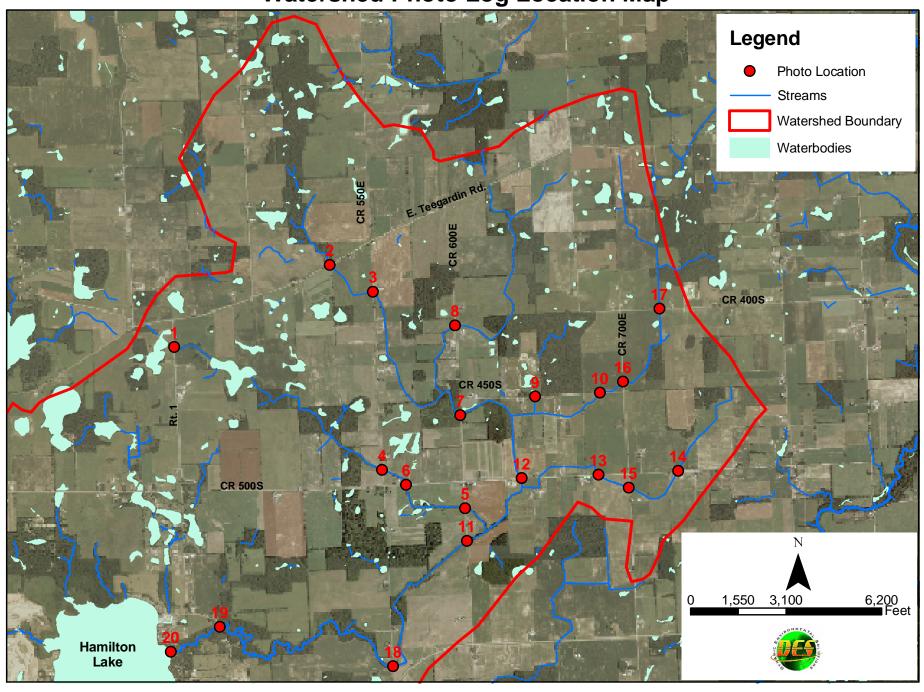


Photo Location Map Guide

Location	Description	Picture #
1	Haughey Ditch at Route 1	1, 2
2	Metz Ditch at E. Teegardin Road	3, 4
3	Metz Ditch at CR 550E	5, 6
4	Haughey Ditch at CR 550E	7, 8
5	Haughey Ditch at CR 600E	9, 10
6	Haughey Ditch at CR 500S	11, 12
7	Metz Ditch at CR 600E	13, 14
8	Burch Ditch at CR 600E	15, 16
9	Unnamed Branch of Black Creek at CR 450S	17, 18
10	Black Creek at CR 450S	19, 20
11	Black Creek at CR 600E	21, 22
12	Black Creek at CR 500S	23, 24
13	Unnamed Branch of Black Creek at CR 500S	25, 26
14	Unnamed Branch of Black Creek at CR 500S	29, 30
15	Unnamed Branch of Black Creek at CR 700E	27, 28
16	Black Creek at CR 700E	31, 32
17	Black Creek at CR 400S	33, 34
18	Black Creek at CR 550E	35, 36
19	Black Creek at Route 1	37, 38
20	Black Creek at Hamilton Lake	39, 40

Page 1 of 20 PHOTO LOG





Picture 1: Haughey Ditch at Route 1 (upstream)



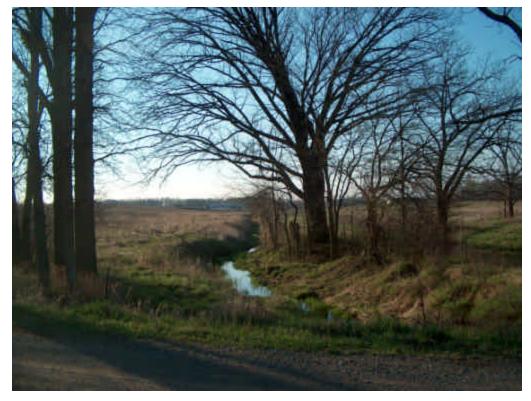
Picture 2: Haughey Ditch at Route 1 (Downstream)

Page 2 of 20 PHOTO LOG





Picture 3: Metz Ditch at E. Teegardin Road (upstream)



Picture 4: Metz Ditch at E Teegardin Road (downstream)

Page 3 of 20 PHOTO LOG





Picture 5: Metz Ditch at CR 550E (upstream)



Picture 6: Metz Ditch at CR 550E (downstream)

Page 4 of 20 PHOTO LOG





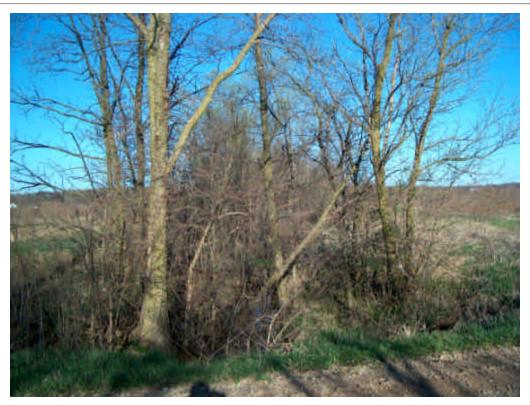
Picture 7: Haughey Ditch at CR 550E (upstream)



Picture 8: Haughey Ditch at CR 550E (downstream)

Page 5 of 20 PHOTO LOG





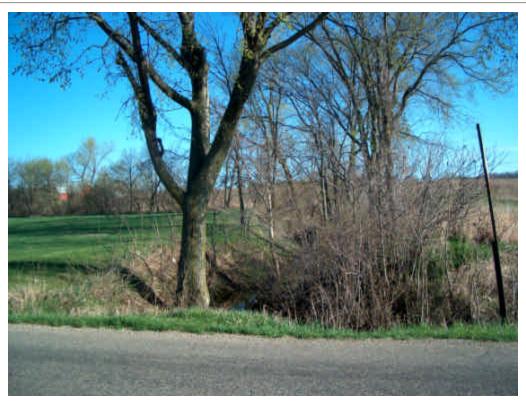
Picture 9: Haughey Ditch at CR 600E (upstream)



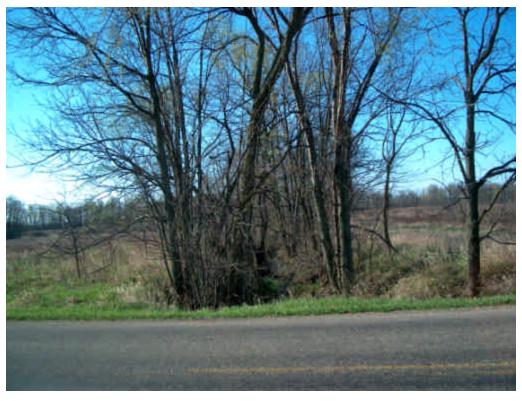
Picture 10: Haughey Ditch at CR 600E (downstream)

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Picture 11: Haughey Ditch at CR 500S (upstream)



Picture 12: Haughey Ditch at CR 500S (downstream)

Page 7 of 20 **PHOTO LOG**





Picture 13: Metz Ditch at CR 600E (upstream)



Picture 14: Metz Ditch at CR 600E (downstream)

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Picture 15: Burch Ditch at CR 600E (upstream)



Picture 16: Burch Ditch at CR 600E (downstream)

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Picture 17: Unnamed Branch of Black Creek at CR 450S (upstream)



Picture 18: Unnamed Branch of Black Creek at CR 450S (downstream)

Page 10 of 20 **PHOTO LOG**





Picture 19: Black Creek at CR 450S (upstream)



Picture 20: Black Creek at CR 450S (downstream)

Page 11 of 20 **PHOTO LOG**





Picture 21: Black Creek at CR 600E (upstream)



Picture 22: Black Creek at CR 600E (downstream)

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Picture 23: Black Creek at CR 500S (upstream)



Picture 24: Black Creek at CR 500S (downstream)

Page 13 of 20 **PHOTO LOG**





Picture 25: Unnamed Branch of Black Creek at CR 500S (upstream)



Picture 26: Unnamed Branch of Black Creek at CR 500S (downstream)

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Picture 27: Unnamed Branch of Black Creek at CR 700E (upstream)



Picture 28: Unnamed Branch of Black Creek at CR 700E (downstream)

Page 15 of 20 **PHOTO LOG**





Picture 29: Unnamed Branch of Black Creek at CR 500S (upstream)



Picture 30: Unnamed Branch of Black Creek at CR 500S (downstream)

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Picture 31: Black Creek at CR 700E (upstream)



Picture 32: Black Creek at CR 700E (downstream)

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Picture 33: Black Creek at CR 400S (upstream)



Picture 34: Black Creek at CR 400S (downstream)

Page 18 of 20 **PHOTO LOG**





Picture 35: Black Creek at CR 550E (upstream)



Picture 36: Black Creek at CR 550E (downstream)

Page 19 of 20 **PHOTO LOG**





Picture 37: Black Creek at Route 1 (upstream)



Picture 38: Black Creek at Route 1 (downstream)

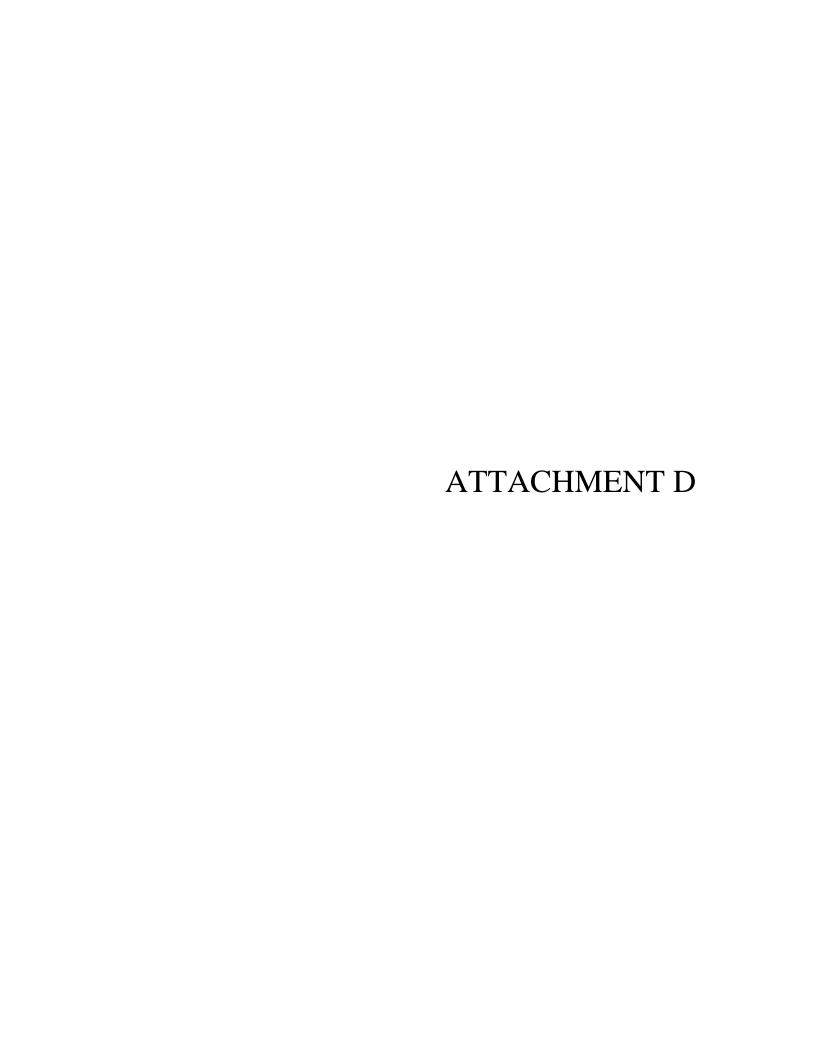




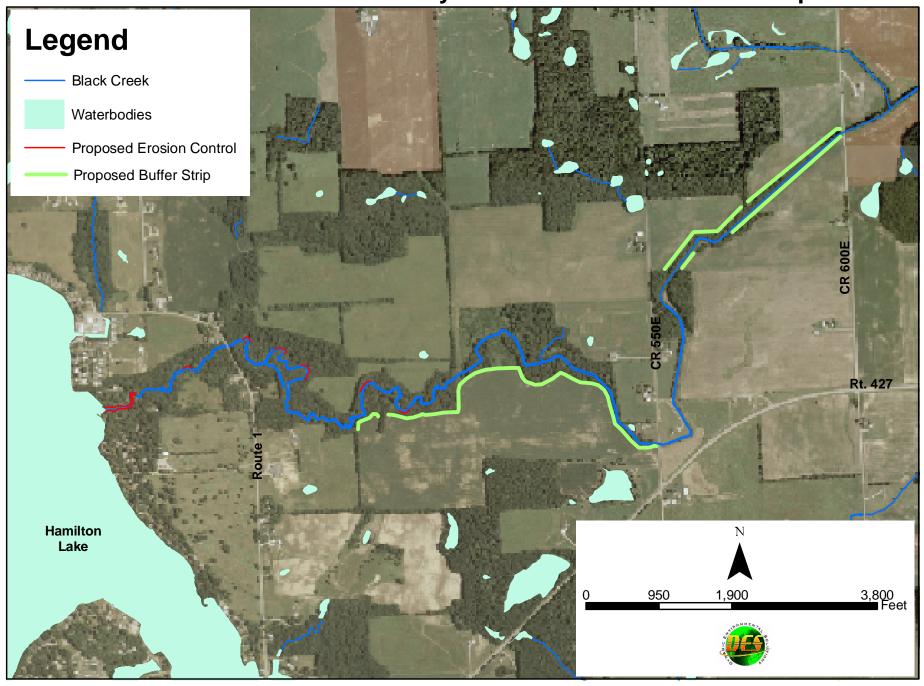
Picture 39: Black Creek at discharge into Hamilton Lake (upstream)



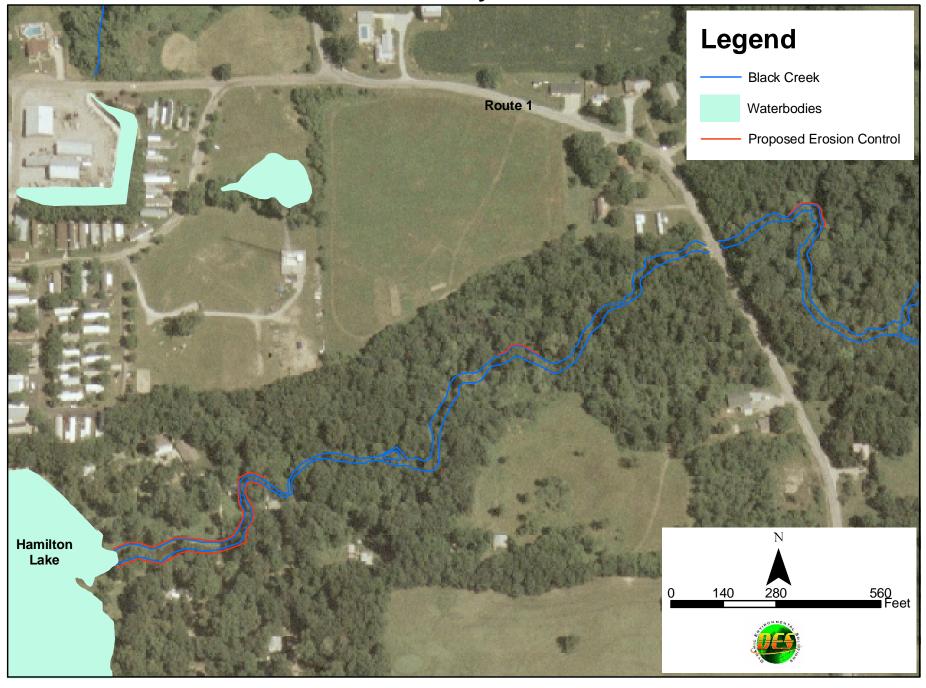
Picture 40: Black Creek at discharge into Hamilton Lake (downstream)



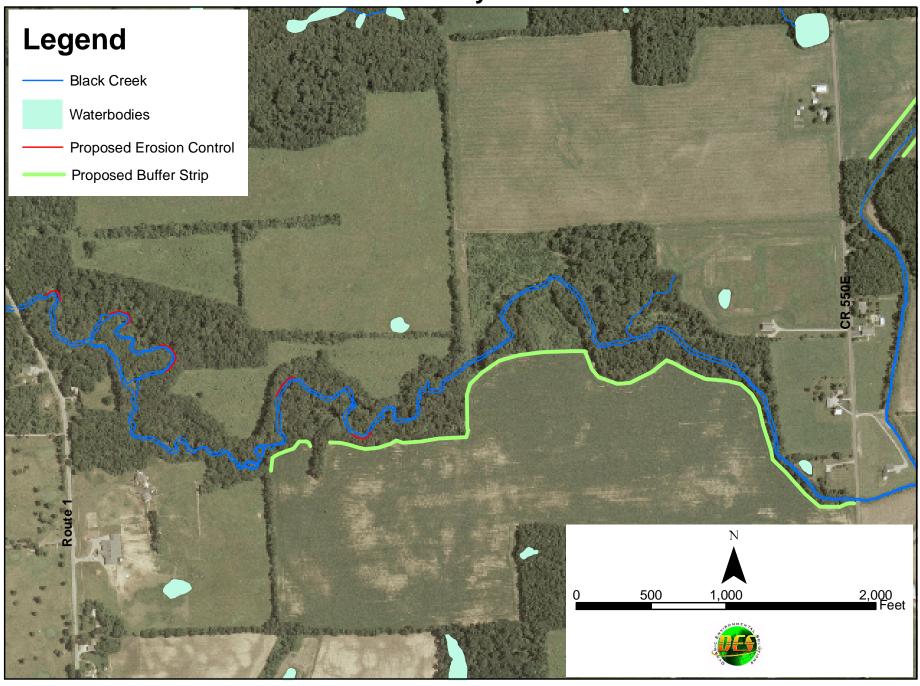
Recommended Water Quality Enhancements - Overview Map



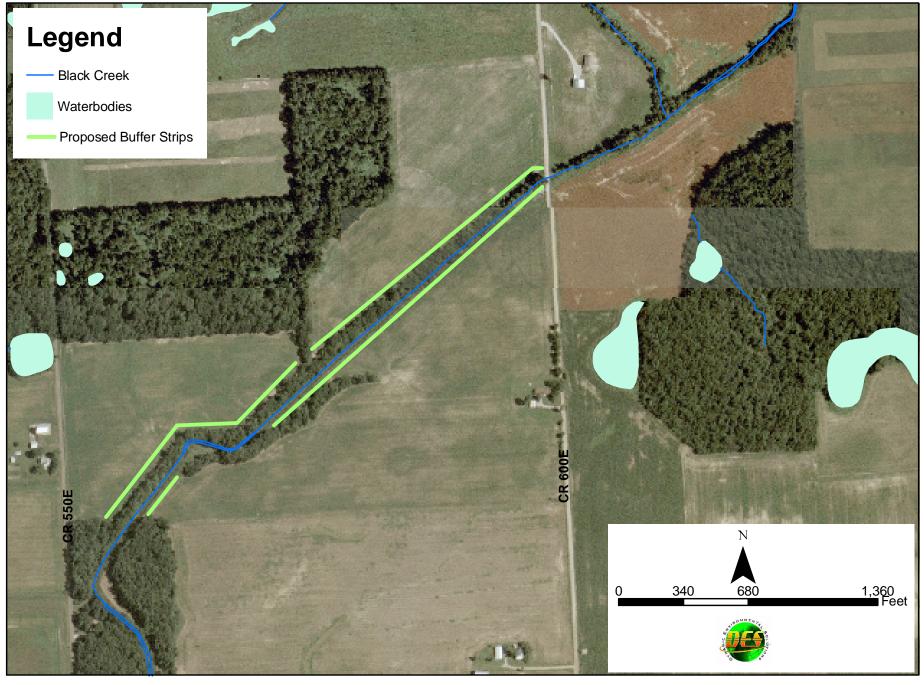
Recommended Water Quality Enhancements - Sheet 1

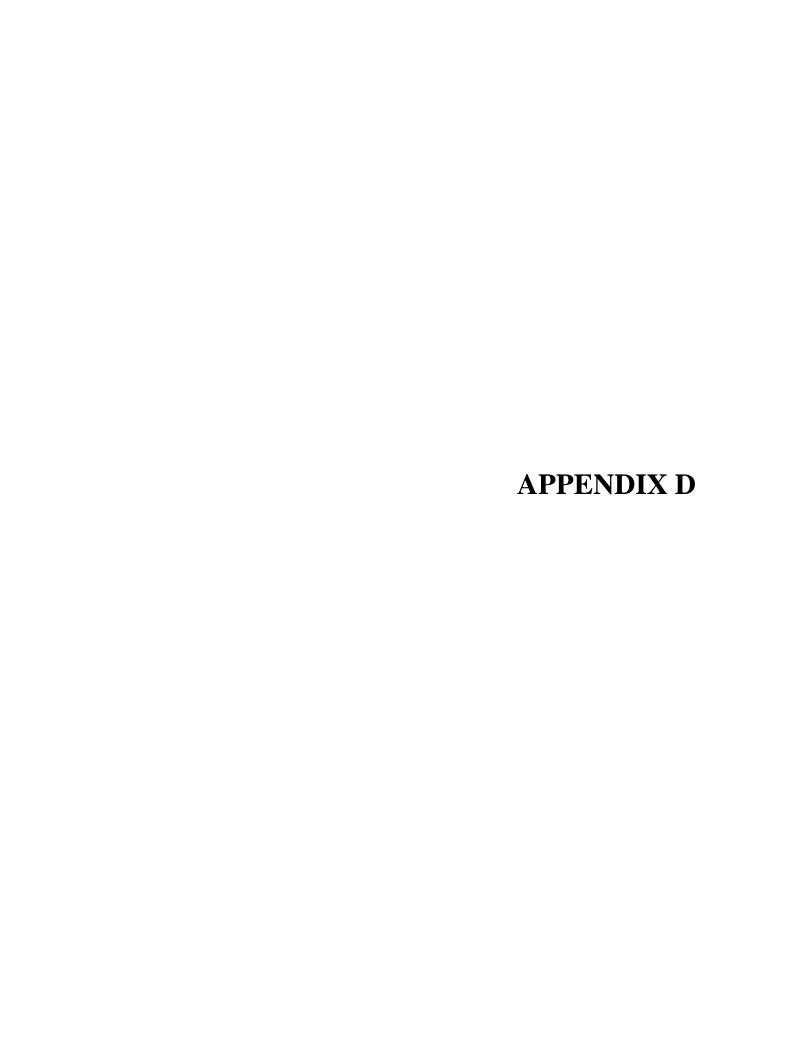


Recommended Water Quality Enhancements - Sheet 2

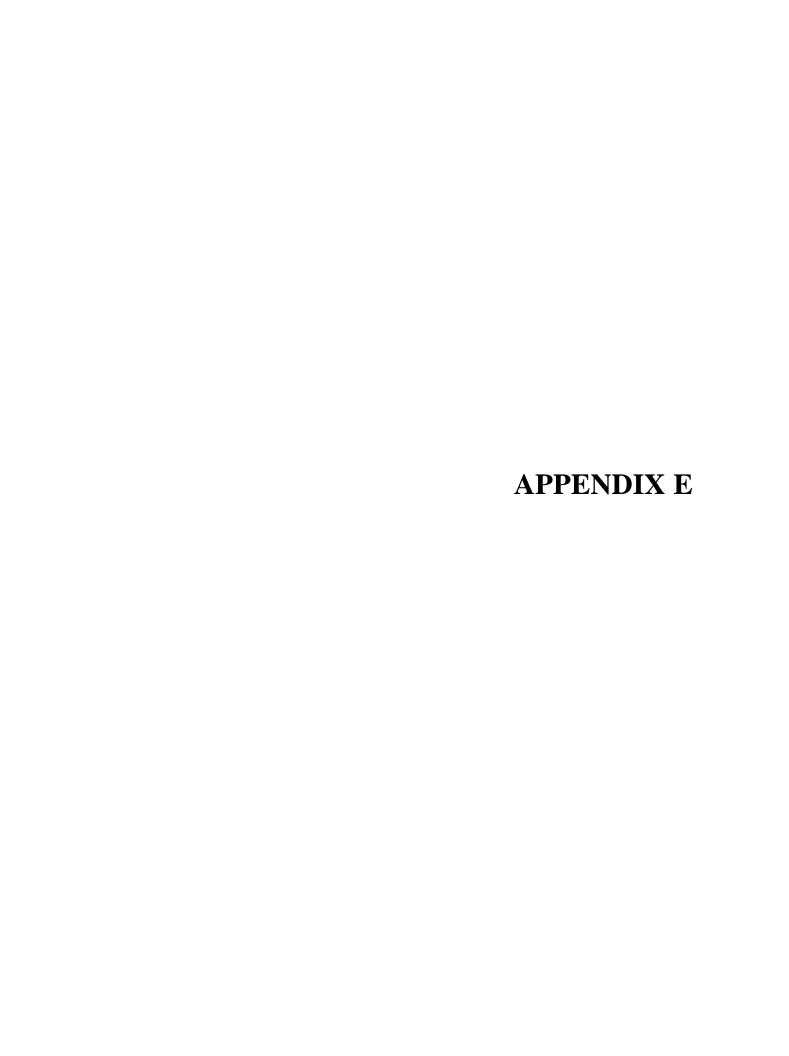


Recommended Water Quality Enhancements - Sheet 3





Owner	Address	City	State	Zip
Streambank Enhancements				
Marie Kreinbrink	13468 Rd 8	Ottawa	OH	45875
Allen & Deborah Byers	95 Ln 110 B Hamilton Lk	Hamilton	IN	46742
John M & Bonnie J Spence	4602 W Burton Dr	Muncie	IN	47304
Edward A Lusch	P O Box 291	Hamilton	IN	46742
John Surfus	285 Virginia Ave	Fort Myers Beach	FL	33931
Cold Springs Inc	6068 St Rd 1	Hamilton	IN	46742
Buffer Strips				
Charles W & Nila M Howard	11630 Trade Wind Cove	Fort Wayne	IN	46845
Deborah Graft	5525 E State Rd 427	Hamilton	IN	46742





February 9, 2006

Ms. Elizabeth McCloskey U.S. Fish & Wildlife Service P.O. Box 2616 Chesterton, IN 46304-2616

Dear Ms. McCloskey:

Dynamic Environmental Solutions, Inc (DES) has been retained by the Hamilton Lake Association (HLA) to perform an Engineering Feasibility Study to determine ways to improve water quality that discharges from the Black Creek watershed into Hamilton Lake, DES successfully worked with HLA in obtaining this grant from the Indiana Department of Natural Resources (IDNR) Lake and River Enhancement (LARE) division. Hamilton Lake is located in Steuben County in Hamilton, Indiana.

The Black Creek watershed, as shown in the attached figure, encompasses approximately 5,600 acres of predominantly agricultural watershed. Water quality improvement options being considered for this study includes constructed wetlands, streambank stabilization, check dams, filter strips, grass swales and other water quality improvement Best Management Practices (BMPs). As early coordination for this project, which is expected to include the submission of specific construction permits to the State of Indiana and U.S. Corps of Engineers this fall, we ask for an environmental review of this watershed that would identify areas of potential concern including the following:

- Presence of threatened and endangered species
- Presence of historical or cultural sites
- Any other areas of potential concern to the U.S. Fish & Wildlife Service

If you have any questions, please call me at (630) 536-7607 or email me at dmulvey@des-group.co.uk. Thanks again for your time and assistance.

Very truly yours,

Dynamic Environmental Solutions, Inc.

Douglas L. Mulvey, P.E., MBA Project Manager

Enclosure: As noted



February 8, 2006

Ms. Christie Kiefer, Environmental Coordinator Indiana Department of Natural Resources Division of Water, Environmental Unit 402 W. Washington St., W264 Indianapolis, IN 46204-2641

Dear Ms. Kiefer:

Dynamic Environmental Solutions, Inc (DES) has been retained by the Hamilton Lake Association (HLA) to perform an Engineering Feasibility Study to determine ways to improve water quality that discharges from the Black Creek watershed into Hamilton Lake DES successfully worked with HLA in obtaining this grant from the Indiana Department of Natural Resources (IDNR) Lake and River Enhancement (LARE) division. Hamilton Lake is located in Steuben County in Hamilton, Indiana.

The Black Creek watershed, as shown in the attached figure, encompasses approximately 5,600 acres of predominantly agricultural watershed. Water quality improvement options being considered for this study includes constructed wetlands, streambank stabilization, check dams, filter strips, grass swales and other water quality improvement Best Management Practices (BMPs). As early coordination for this project, which is expected to include the submission of specific construction permits this fall, we ask for an environmental review of this watershed that would identify areas of potential concern including the following:

- Presence of threatened and endangered species
- Presence of historical or cultural sites
- Any other areas of potential concern to the Indiana Department of Natural Resources

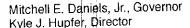
If you have any questions, please call me at (630) 536-7607 or email me at dmulvey@desgroup.co.uk. Thanks again for your time and assistance.

Very truly yours,

Dynamic Environmental Solutions, Inc.

Douglas L. Mulvey, P.E., MBA Project Manager

Enclosure: As noted





Division of Historic Preservation & Archaeology 402 W. Washington Street, W274-Indianapolis, IN 46204-2739

HISTORIC PRESERVATION AND ARCHAEOLOGY

March 21, 2006

Douglas L. Mulvey Dynamic Environmental Solutions, Inc. 5 S 506 Bonnie Court Naperville, Illinois 60563

Phone 317-232-1646 Fax 317-232-0693 · dhpa@dnr.IN.gov

State Agency: Indiana Department of Natural Resources

Re: Information concerning an engineering feasibility study to determine ways to improve the water quality of discharges from Black Creek watershed into Hamilton Creek(DNR #12024)

Dear Mr. Mulvey:

Pursuant to Indiana Code 14-21-1 the Indiana Department of Natural Resources, Division of Historic Preservation and Archaeology ("DHPA") has conducted a review of the materials dated February 8, 2006, and received by the DHPA on February 17, 2006, for the above indicated project in the Black Creek watershed, Steuben County, Indiana.

In terms of potential impact upon archaeological resources, a review of our records indicates that the 5,600 acre project area is environmentally suitable to contain archaeological resources, but has never been evaluated by a qualified archaeologist. Moreover, there are likely to be dozens of previously unrecorded archaeological sites within the Black Creek watershed. If any of the proposed project activities entail ground disturbing activities, then an archaeological reconnaissance will most likely be required to determine the presence or absence of archaeological resources. This determination will be made specific to each individual construction permit submitted to our office. Also, please be advised that if any archaeological artifacts, features, or human remains are uncovered during construction, state law (Indiana Code 14-21-1-27 & 29) requires that the discovery must be reported to the Department of Natural Resources.

In regard to buildings and structures, please provide the indicated information to facilitate the identification and analysis of historic properties in the project area:

- 1) Identify the undertaking.¹
- 2) Provide an overall description of the project and its location.
 - Include address, city, township, and county.
 - Detail any construction, demolition, and earthmoving activities.
- 3) Define the area of potential effects² and provide a map or a good quality photocopy of a map containing the following:
 - The boundaries of the area of potential effects and the precise location of the project area within those boundaries clearly outlined in dark ink on a copy of the relevant portion of a town, city, county, or U.S. Geological Survey quadrangle map.

Undertaking means a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; those requiring a Federal permit, license or approval; and those subject to state or local regulation administered pursuant to a delegation or approval by a Federal agency (see 36 C.F.R. § 800.16[y]).

Area of potential effects means the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking (see 36 C.F.R § 800. 16[d]).

- The names of nearby landmarks clearly labeled (e.g., major streets, roads, highways, railroads, rivers, lakes).
- 4) Give the precise location of any buildings, structures, and objects within the area of potential effects (e.g., addresses and a site map with properties keyed to it).
- 5) Give the known or approximate date of construction for buildings, structures, objects, and districts within the area of potential effects.
- 6) Submit historical documentation for buildings, structures, objects, and districts within the area of potential effects.
- 7) List all sources checked for your historical research of the area of potential effects.
- 8) Provide recent, clear photographs or good quality computer-generated images (not photocopies), keyed to a site plan, showing the exterior of any buildings, structures, objects, or land that could be affected in any way by the project.

If you have any further questions regarding this determination, please contact our office at (317) 232-1646. Questions about archaeological issues should be directed to Christopher Koeppel or Dr. Rick Jones. Questions about historic buildings or structures pertaining to this project should be directed to Miriam Widenhofer.

Very truly yours

Miriam L. Widenhofer Structures Review Assistant

JCS:CDK:MLW:mlw

Enclosures (4)

cc: Christie Stanifer, Indiana Department of Natural Resources, Division of Water

- Y. Wedeshe Gr

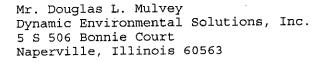
United States Department of the Interior Fish and Wildlife Service



Bloomington Field Office (ES) 620 South Walker Street Bloomington, IN 47403-2121

Phone: (812) 334-4261 Fax: (812) 334-4273

March 30, 2006



Project: Black Creek Lake and River Enhancement Feasibility Study Location: Black Creek Watershed of Hamilton Lake, Steuben County

Dear Mr. Mulvey:

This responds to your letter dated February 9, 2006, requesting our comments on the aforementioned project.

These comments have been prepared under the authority of the Fish and Wildlite Coordination Act (16 U.S.C. 661 et. seq.) and are consistent with the intent of the National Environmental Policy Act of 1969, the Endangered Species Act of 1973, and the U.S. Fish and Wildlife Service's Mitigation Policy.

The project consists of an investigation of the Black Creek Watershed to determine water quality improvement options related to streambank erosion, runoff from fields and residential sites, and similar issues. The watershed encompasses approximately 5,600 acres of primarily agricultural lands. These agricultural lands include active row-crop cropland, pasture, and fallow fields that likely are within the U.S. Department of Agriculture's Conservation Reserve Program (CRP). Also present are significant woodlands, including Classified Forest (an Indiana Department of Natural Resources program) and Palustrine forested wetlands. Ponds and emergent wetlands are also found within the watershed. Black Creek enters Hamilton Lake on the northeast side of the lake between the Clarks Landing and Cold Springs developments.

The watershed is within the Steuben Morainal Lake Physiographic Area, which is a complex morainal topography created by glaciers (Schnieder, A.F. 1966. Physiography. Pages 40-56 in Natural Features of Indiana, A.A. Lindsey, ed. Indiana Academy of Science, Indianapolis). There is about 100 feet of elevation difference between the highest ground in the watershed and Hamilton Lake, which is considerable within such a small watershed.

Upstream from County Road 550 East, Black Creek is essentially a channelized ditch. Several ditches enter the main stream, including Haughey Ditch, which drains the west side of the watershed, and the Davis Ditch/Lillian Metz Ditch/Burch Ditch system which drains the northcentral portion of the watershed. Other smaller laterals are also present. Downstream of CR 550E Black Creek is essentially natural within an entrenched channel through a hilly area. This lower section is quite wooded, while the channelized section upstream has few trees and has grass along the banks.



2.

Bank erosion is common within the channelized section of Black Creek and its tributaries because of the steep banks and lack of woody vegetation. Streambank stabilization, preferably through native woody plantings but also with riprap where necessary, would help reduce this erosion. Buffer strips along the waterways to separate cropland from the stream channels would help reduce runoff into the streams. The significant amount of CRP land in the watershed reduces runoff from these lands because of the permanent grass/herbaceous vegetation cover; however, if these lands are taken out of CRP, there likely would be increased row-cropping, with resultant increased runoff of soil and nutrients. Landowners should be encouraged to keep erodable lands in CRP or other suitable programs, such as planting to mative prairie under the U.S. Fish and Wildlife Service's Partners for Fish and Wildlife Program. A review of the soils data for the watershed (2005 USDA SSURGO) indicates that soil types within the Black Creek watershed vary from slightly erodible to highly erodible, with wind erosion being a problem with muck soils when they are dry and unvegetated, and sheet and rill erosion from water runoff being a problem with sand and clay loams in hilly areas.

Some of the significant woodlands in the watershed are along the streams but most appear to not be directly connected to the waterways, which is likely why forested and scrub-shrub wetlands remain within these woodlands. Enclosures No. 1 and No. 2, the National Wetlands Inventory maps of the area (Hamilton and Edon Quadrangles) show the numerous wetlands in the watershed. However, these maps were based upon 1983 aerial photography and do not necessarily reflect the current extent of wetlands, including ponds that have been constructed since that time. Restoration of drained wetlands, enhancement of degraded wetlands, and preservation of existing high quality wetlands could help improve water quality in the watershed.

A former landfill of about 18 acres, which has been inactive for 20 years, is located on the north side of CR 450S, between CR 600E and CR 700E, just north of Black Creek. We understand that there has been significant erosion from this site in the past but do not know the current status. An attempt to establish a new landfill on adjacent lands was not allowed.

ENDANGERED SPECIES

The proposed project is within the range of the Federally endangered Indiana bat (<u>Myotis sodalis</u>), the threatened bald eagle (<u>Haliaeetus leucocephalus</u>) and northern copperbelly water snake (<u>Nerodia erythrogaster neglecta</u>), and the candidate eastern massassauga rattlesnake (<u>Sistrurus catenatus</u> catenatus).

There may be suitable summer maternity habitat for the Indiana bat along the lower wooded portion of Black Creek and within the various large woodlands. Maternity colonies occupy roost sites in forested floodplain or upland habitats and are very loyal to their roosts and nightly foraging area, which are usually centered over riparian forests. Females and their young utilize both primary and secondary roosts, with the roosts usually being under exfoliating bark or living or dead trees, although tree cavities are also sometimes used.

Bald eagles do not nest in Steuben County but they are occasional visitors to the lakes of northern Indiana, particularly during winter. There is no specific Habitat for the bald eagle in the Black Creek Watershed.

The northern copperbelly water snake is known from the adjacent Fish Creek
Watershed, so has been found within a few miles of the Black Creek Watershed.
Suitable habitat for this species in the form of Palustrine forested and scrub-shrub
wetlands and adjacent upland woodlands are present with the Black Creek Watershed.
We do not have specific information on the presence or absence of this species
within the Black Creek Watershed, but if it is present it would likely benefit from

preservation of existing forested/scrub-shrub wetlands, the restoration of additional wetlands, and the planting of riparian corridors. Depending upon the location of project activities, pre-construction surveys for the northern copperbelly may be needed.

The eastern massasauga is found in relatively open habitats such as wet prairies, sedge meadows, and old fields, and tends to avoid heavily wooded areas. Since many of the wetlands in the Black Creek Watershed are forested or scrub-shrub, the open grassy wetlands that massasaugas require do not appear to be present. However, depending upon the location of project activities, pre-construction surveys for this species may be warranted.

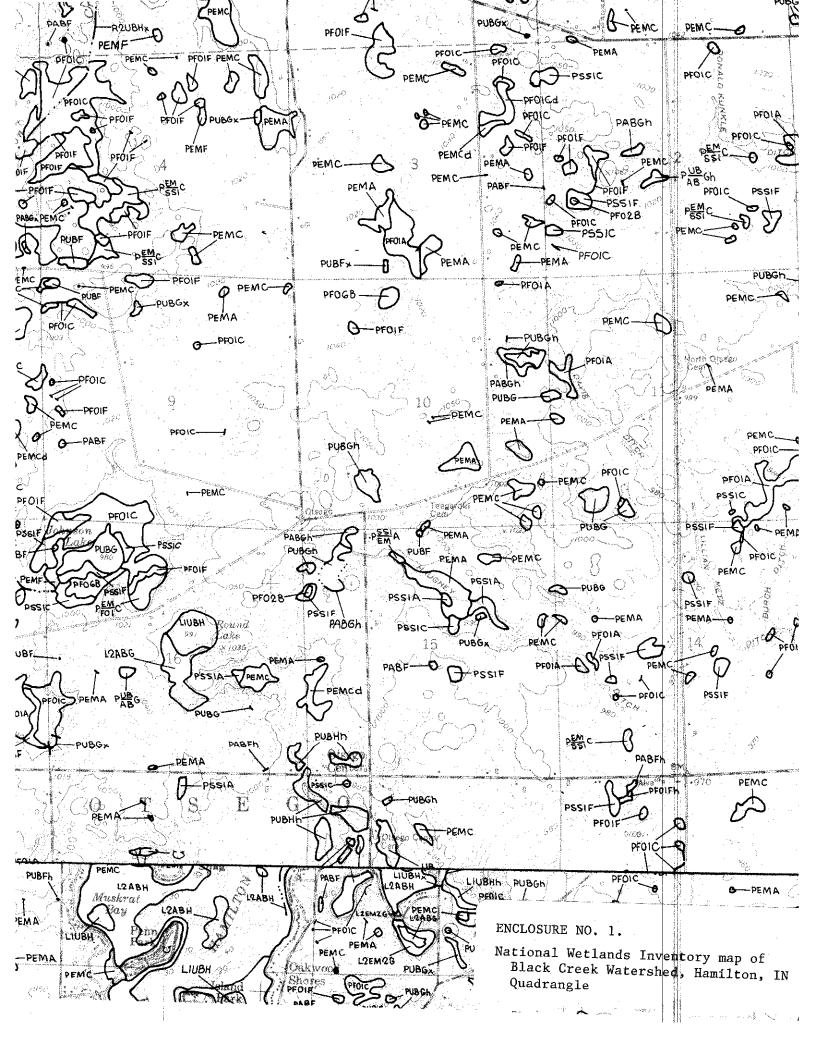
These endangered species comments constitute informal consultation only. They do not fulfill the requirements of Section 7 of the Endangered Species Act of 1973, as amended.

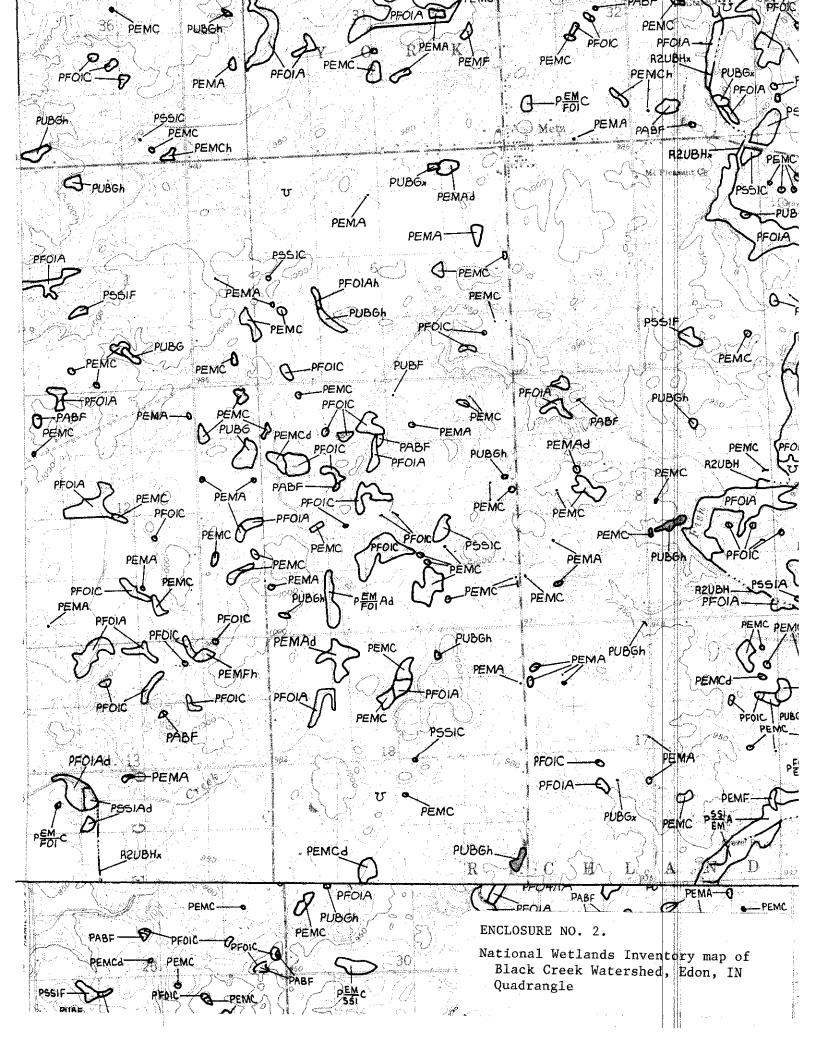
We appreciate the opportunity to comment at this early stage of project planning. Please keep us informed about project planning as it progresses. If you have any questions, please contact Elizabeth McCloskey at (219) 983-9753 or elizabeth mccloskey@fws.qov.

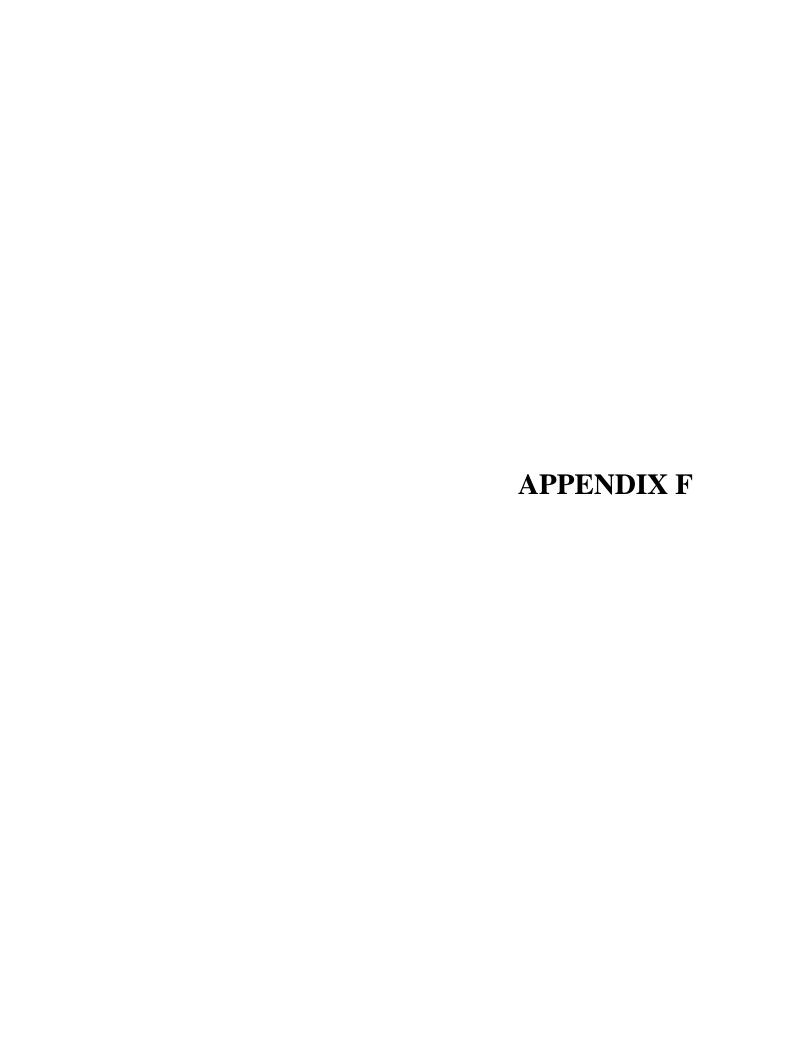
Sincerely yours,

Scott E. Pruitt Supervisor

cc: Christie Stanifer, Environmental Coordinator, Division of Water, Indianapolis LARE Section, Division of Fish and Wildlife, Indianapolis, IN IDEM, Office of Water Management, Indianapolis, IN







Environmental Assessment

We have opted to mimic the guidelines of the U.S. Environmental Protection Agency's Clean Lakes Program in order to assess the environmental effects of proposed projects in the five small subwatersheds. These guidelines involve a checklist approach to impact assessment and can be found in the Code of Federal Regulations, Title 40, Part 35, Subpart H. These guidelines involve 14 questions which may be satisfactorily answered with a mere "Yes" or "No", but should detail important benefits or adverse effects sufficiently to allow for mitigation planning during the design and implementation phases.

None of the proposed projects have significant adverse effects on the physical, biological or social environment. The small scale of the proposed projects limit their adverse effects on environmental resources.

Issue	Streambank Stabilization	Buffer Strips	Grade Control
Will the proposed project displace any people?	No	No	No
Will the proposed project deface existing residences or residential areas? What mitigative actions such as landscaping, screening, or buffer zones have been considered? Are they included?	No. Landscaping will be included in the design of the streambank stabilization.	No. Landscaping will be included in the design of the buffer strips.	No
Will the proposed project be likely to lead to a change in established land use patterns, such as increased development pressure near the lake? To what extent and how will this change be controlled through land use planning, zoning, or through other methods?	No	Conversion of agricultural land to grassland and tree buffers.	No
Will the proposed project adversely affect a significant amount of prime agricultural land or agricultural operations on such land?	No	No. Although buffer strips will take approximately 30 feet of agricultural land along select portions of stream.	No
Will the proposed project result in a significant adverse effect on parkland, other public land, or lands of recognized scenic value?	No	No	No
Has the State Historical Society or State Historical Preservation Officer been contacted? Has he responded, and if so, what was the nature of that response? Will the proposed project result in a significant adversely effect on lands or structures of historic, architectural, archaeological or cultural value?	The SHPO has not been contacted but none of the proposed projects will affect historic structures or known cultural resources.	The SHPO has not been contacted but none of the proposed projects will affect historic structures or known cultural resources.	The SHPO has not been contacted but none of the proposed projects will affect historic structures or known cultural resources.
Will the proposed project lead to a significant long-range increase in energy demands?	No	No	No
Will the proposed project result in significant and long range adverse changes in ambient air quality or noise levels? Short term?	No	No	No
If the proposed project involves the use of in-lake chemical treatment, what long and short term adverse effects can be expected from that treatment? How will the project recipient mitigate these effects?	No in -lake treatments proposed.	No in -lake treatments proposed.	No in -lake treatments proposed.
Is the proposed project located in a floodplain? If so, will the project involve construction of structures in the floodplain? What steps will be taken to reduce the possible effects of flood damage to the project?	Yes. Design improvement is to mitigate against damage from high flow events. Structures will adequately anchored and reinforced to withstand flood flow forces.	Possibly. Erosion control matting installation might be required depending on flood flow velocities.	Yes. Design improvement is to mitigate against damage from high flow events. Structures will adequately anchored and reinforced to withstand flood flow forces.
If the project involves physically modifying the lake shore or its bed or its watershed, by dredging, for example, what steps will be taken to minimize any immediate and long term adverse effects of such activities? When dredging is employed, where will the dredged material be deposited, what can be expected and what measures will the local sponsor employ to minimize any significant adverse impacts from its	Project is designed to reduce sediment and sediment-related pollutant loads to the lake.	Project is designed to reduce sediment and sediment-related pollutant loads to the lake.	Project is designed to reduce sediment and sediment-related pollutant loads to the lake.

Issue	Streambank Stabilization	Buffer Strips	Grade Control
deposition?			
Will the proposed project have a significant	Negligible affects on fish, wildlife or protected	Positive impact on wildlife and wildlife habitat.	Negligible affects on fish, wildlife or protected
adverse effect on fish and wildlife, or on wetlands	resources.		resources.
or any other wildife habitat, especially those of			
endangered species? How significant is this			
impact in relation to the local or regional critical			
habitat needs? Have actions to mit igate habitat			
destruction been incorporated into the project?			
Has the recipient properly consulted with			
appropriate State and Federal fish, game and			
wildlife agencies and with the U.S. Fish and			
Wildlife Service? What were their replies?			
Describe any feasible alternatives to the proposed	Constructed wetlands – site specific location	Constructed wetlands – site specific location	Constructed wetlands – site specific location
project and why they were not proposed.	(dense forested area) lead to potential	(dense forested area) lead to potential	(dense forested area) lead to potential
	construction difficulties and high cost.	construction difficulties and high cost.	construction difficulties and high cost.
Describe other measures not discussed previously	NA	NA	NA
that are necessary to mitigate adverse			
environmental impacts resulting from the			
implementat ion of the proposed project.			

APPENDIX	\mathbf{G}

r						
Date:	4),5/06	Citizens Qua	itative Hab	oitat Evalua	tion Inde	₩ 40 CQHEI Tota
Vol [ID:			rer and itershed: M-e	te Ditil (Q E 70	regardin
	ıbstrate (Boti	tom Type)				Score: 5
a) S	Size		b) ":	Smothering"	(c)	"Silting"
14 pt	Mostly Large (Fist Size or Bigger	r) Mostly Small Than Fingern 6 pt Coarse, or Be	ail, but Still 📗 🔼	Y Are Fist Size and La Pieces Smothered B Sands/Silts?	ly L	Are Silts and Clays Distributed Throughout Stream?
10 pt	Mostly Medium (Smaller than Fist, Bigger than Finger		ine (Not	Symptoms: Hard to Large Pieces, Ofter Black on Bottom w	en vith Few	Symptoms: Light Kicking of Bottom Results in Substantial Clouding of Stream for More than a Minute or Two
II. F	ish Cover (Hi	iding Places) - Add	l 2 Points For	Each One Pre	sent	Score: 2
	Underwater Tree Roots (Large)	Boulders	Downed T		Vater Plants	Undercut Banks
2 pt 2 pt	Underwater Tree Rootlets (Fine)	2 pt Backwaters, Oxbows or Side 2 pt Channels	2 pt Shallow, S Areas for 2 pt Small Fish	Slow 2 pt	Deep Areas Chest Deep)	2 pt Shrubs, Small Trees that Hang Close Over the Bank
III. S	Stream Shape	and Human Alter	ations		V 1	Score: 15
a) "		or "Sinuousity" of	Channel	b) How Nat	tural Is The	Site?
8 pt	2 or More Good Bends	1 or 2 Good Be	ends	Mostly Na	ı	Many Man-made Changes, but still some natural conditions left (e.g., trees, meanders)
3 pt	Mostly Straight Some "Wiggle"	O pt	aight	. 49 pt (e.g., a bri	e Changes 🔄 🖠	Heavy, Man-made Changes (e.g., leveed opt or channelized)
IV. S	Stream Fores	ts & Wetlands (Ri	oarian Area) &	Erosion		Score: /3
	Nidth of	b) Land Use -	Mostly:	c) Bank E	rosion -	d) How Much of
	arian Forest	السسا	Conserva Tillage	^{tion} Typica	ılly:	Stream is Shaded
We	tland - Mostly	y: 5 pt Shrubs	2 pt Suburban		lard or Well- ed Banks	Mostly
8 pt	Wide (Can't Throw A Rock Through/ Across It)	4 pt Overgrown	1 pt Row Crop	4 pt Combine	ation of Stable ding Banks	3 pt Partly
X	Narrow (Can Throv A Rock Through/		1 pt	2 pt	ollapsing	2 pt
5 pt	Across It)	Fenced Pastur	e Open Pas 0 pt	Banks	ларыну	0 pt
0 pt	None	Park (Grass)	Urban/ Industrial			
	epth & Veloc	2 pt	0 pt	8		Score:
-	Deepest Pool		b) Check AL	L The Flow Ty	pes That Y	ou See (Add Points)
8 pt	Chest Deep	Knee Deep	Very Fast: H Stand in the	lard to	loderate: Slowly T bjects Downstrea	akes None
6 pt	Waist Deep	Ankle Deep	Fast: Quickly Objects Dow	y Takes 🗀 S	low: Flow learly Absent	7 194 40 40 40 40 40 40 40 4
·-·	Riffles/Runs ((Areas Where Curre	nt is Fast/Turbເ	ılent, Surface M	ay Be Broke	en) Score: 4
_	Riffles/Runs A		b) R	Riffle/Run Subs	strates Are:	maller Than Your
8 pt	Deeper & Fast Ankle/Calf	Less & Slow	7 pt	Smaller Than Fist Size	*0 pt	ingernails or Do Not Exist
 6 pt	Deep & Fast	O pt	6 pt	but Larger Than Fingernail		

Date: 4/15/06 C	itizens Qualit	ative Habita	t Evaluation Ir	idex /9 CQHEI Total
Vol Site	River Water	- L 11/1 4 L	@ CR 550E	- Odriel (od)
I. Substrate (Bottom			The state of the s	Score:
	туре)	Lb) "Sma	othering"	c) "Silting"
a) Size Mostly Large (Fist Size or Bigger)	Mostly Small (Sn Than Fingernall, 6 pt Coarse, or Bedro	naller Are	Fist Size and Larger ces Smothered By ds/Silts?	Are Silts and Clays Distributed Throughout NO Stream? 5 pt
Mostly Medium (Smaller than Fist, but 10 pt Bigger than Fingernail)	Mostly Very Fine Coarse, Sometin 0 pt Greasy or Mucky	nes YES B	ymptoms: Hard to Move arge Pieces, Often lack on Bottom with Few nsects	YES Opt Minute or Two
II. Fish Cover (Hidin	g Places) - Add 2	Points For Eac	:h One Present	Score: 2
Underwater Tree Roots (Large) 2 pt Underwater Tree Rootlets (Fine)	Boulders pt Backwaters, Oxbows or Side pt Channels	Downed Trees, Logs, Branches 2 pt Shallow, Slow Areas for 2 pt Small Fish	Water Plants	Undercut Banks 2 pt Shrubs, Small Trees that Hang Close Over the Bank
III. Stream Shape ar	id Human Alterat			Score: 3
a) "Curviness" or "	_	hannel	b) How Natural Is `	The Site?
2 or More Good Bends	1 or 2 Good Bend		Mostly Natural 12 pt	Many Man-made Changes, but still some natural conditions left (e.g., trees, meanders)
Mostly Straight Some "Wiggle"	Very Straight	nt	9 pt A Few Minor Man-made Changes (e.g., a bridge, some streambank changes)	Heavy, Man-made Changes (e.g., leveed or channelized)
IV. Stream Forests &	& Wetlands (Ripa	rian Area) & Er	osion	Score: 9
a) Width of	b) Land Use - M		c) Bank Erosion	
Riparian Forest &	Forest/Wetland	Conservation Tillage	Typically:	Stream is Shaded?
Wetland - Mostly:	5 pt	2 pť	Stable Hard or Well-	Mostly
Wide (Can't Throw	Shrubs 4 pt	Suburban 1 pt	Vegetated Banks 4 pt	3 pt
A Rock Through/ 8 pt Across It)	Overgrown Fields	Row Crop	Combination of State and Eroding Banks	Partly
Narrow (Can Throw A Rock Through/	3 pt Fenced Pasture	1 pt Open Pasture	2 pt Raw, Collapsing	2 pt None
5 pt Across It) None	2 pt Park (Grass)	0 pt Urban/	LI Banks 0 pt	Ор
o pt	2 pt	lndustrial 0 pt	•	
V. Depth & Velocity			<u>}</u>	Score: /
a) Deepest Pool is	At Least:	•		at You See (Add Points):
Chest Deep 4 pt	Knee Deep	Very Fast: Hard to Stand in the Curre		
Waist Deep	Ankle Deep	Fast: Quickly Take Objects Downstre	es Slow: Flow	, a.,
6 pt / 0 pt / VI. Riffles/Runs (Arc	ac Mhoro Curron	3 pt	∕i pt Ł Surface May Be B	roken) Score: 4
a) Riffles/Runs Are			e/Run Substrates	
Knee Deep or Deeper & Fast	Ankle Deep or Less & Slow	Fist	Size or Larger	Smaller Than Your Fingernails or Do Not Exist
8 pt Ankle/Calf Deep & Fast	4 pt Do Not Exist		0 iller Than Fist Size, arger Than	P *
6 pt	0 pt		ernail	

Date:	4/1906	Citizens Qual	itative Habit	at Evaluation Ir	73 CQHEI Total
Vol [ID: [, ,	er and tershed: Hagher	Ditel Q CRS	
	ıbstrate (Bo	oftom Type)			Score: /5
	ize	ttom Typo,	I b) "Sm	nothering"	c) "Silting"
14 pt	Mostly Large (Fist Size or Bigg Mostly Medium (Smaller than Fis	6 pt Coarse, or Be Mostly Very F Coarse, Some	Smaller All All All All All All All All All Al	re Fist Size and Larger leces Smothered By ands/Silts? Symptoms: Hard to Move Large Pieces, Often Black on Bottom with Few Insects	Are Silts and Clays Distributed Throughout Stream? 5 pt Symptoms: Light Kicking of Bottom Results in Substantial Clouding of Stream for More than a Minute or Two
n e	ish Cover (F	Hiding Places) - Add	। 2 Points For Ea	ich One Present	Score: //
2 pt 2 pt	Underwater Tree Roots (Large) Underwater Tree Rootlets (Fine)	Boulders 2 pt	Downed Tree Logs, Branch 2 pt Shallow, Slow Areas for 2 pt Small Fish	s, Water Plants es 2 pt	Undercut Banks 2 pt Shrubs, Small Trees
III. S	tream Shap	oe and Human Alter	ations	A	Score: 16.5
a) "		or "Sinuousity" of	Channel	b) How Natural Is	The Site?
8 pt	2 or More Good Bends	1 or 2 Good Be	nds	Mostly Natural	Many Man-made Changes, but still some 6 pt natural conditions left (e.g., trees, meanders)
3 pt	Mostly Straight Some "Wiggle"	Very Stra	aight	A Few Minor Man-made Changes (e.g., a bridge, some streambank changes)	Heavy, Man-made Changes (e.g., leveed 0 pt or channelized)
IV. S	Stream Fore	ests & Wetlands (Ri	arian Area) & E	rosion	Score: 16.5
	Nidth of	b) Land Use -		c) Bank Erosion	- d) How Much of
•	arian Fores	' /	Conservation	Typically:	Stream is Shaded?
	tland - Mos Wide (Can't Thro A Rock Through	tly: 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pastur 2 pt	0 pt Urban/ Industrial	Stable Hard or Well-Vegetated Banks 4 pt Combination of Stat and Eroding Banks 2 pt Raw, Collapsing Banks 0 pt	3 pt Partly 2 pt None 0 pt
V. E	epth & Velo	ocity			Score: 5
a) l	Deepest Po	ol is At Least:	,	The Flow Types Th	at You See (Add Points):
8 pt 6 pt	Chest Deep Waist Deep	Knee Deep 4 pt Ankle Deep 0 pt S (Areas Where Curre	Very Fast: Hard Stand in the Cu 2 pt Fast: Quickly Ta Objects Downsl	orrent 1 pt Objects Down 1 pt Slow: Flow Nearly Absen	nstream Upt
	Riffles/Runs			fle/Run Substrates	
8 pt 6 pt	Knee Deep or Deeper & Fast Ankie/Calf Deep & Fast	Ankle Deep o Less & Slow Do Not Exist 0 pt	Fish Fish Fish Fish Fish Fish Fish Fish	st Size or Larger	Smaller Than Your Fingernails of Do Not Exist pt

						•	
Date:	4/15	Citizens Qua	litative Ha	bitat Eva	aluation In	dex	46 CQHEI Total
Vol [Site		iver and	2 ml - 2 C /	@ CocoE		CUMELIOIAL
ID: İ	ID:		atershed: PI	Ushen Dutel	(a) Coose	0	
	ıbstrate (Botto	m Type)		(Con oth orig	n ex??	Sco c) "Silting	222
a) 8	Size	Mostly Smal	<u> </u>	"Smotheriı □ Are Fist Size	_		s and Clays
14 pt	Mostly Large (Fist Size or Bigger)	Than Finger 6 pt Coarse, or E	nail, but Still 📗 🖳			NO Stream 5 pt	ited Throughout ?
 10 pt	Mostly Medium (Smaller than Fist, bu Bigger than Fingernal		netimes 😾	Large Pieces Black on B	s: Hard to Move ces, Often sottom with Few	YES Stre	ptoms: Light Kicking oftom Results in stantial Clouding of am for More than a te or Two
II. F	ish Cover (Hid	ing Places) - Ad	d 2 Points Fo	r Each One	e Present	Sco	re: 6
	Underwater Tree	Boulders	Downed	Trees,	Water Plants		Undercut Banks
2 pt	Roots (Large) Underwater Tree	2 pt Backwaters.	2 pt Shallow		2 pt Deep Areas	2 pt	Shrubs, Small Trees
2 pt	Rootlets (Fine)	Oxbows or Side 2 pt Channels	Areas fo	or	(Chest Deep)	2 pt	that Hang Close Over the Bank
•	Stream Shane a	and Human Alte				'Sco	re: 16.5
		"Sinuousity" o		b) Hov	w Natural Is T	he Site?	
	2 or More Good Bends	or 2 Good B				☐ Manv	Man-made
8 pt	MAN	6 pt		12 pt	ostly Natural	Chan	es, but still some il conditions left trees, meanders)
					Few Minor	— Heav	y, Man-made
	Mostly Straight Some "Wiggle"	Very St	raight	M LY	an-made Changes .g., a bridge, some	L Chan	ges (e.g., leveed innelized)
3 pt	Some vviggle	0 pt		sti	reambank changes)	. •	
				0 (=:	10.5	Sco	re: 17.5
		& Wetlands (R			ank Erosion -		www.y.much of
	Width of parian Forest &	b) Land Use	Conser	vation T	ypically:		m is Shaded
	tland - Mostly:		Tillage 2 pt		Stable Hard or Well-	[7	Mostly
	Wide (Can't Throw	Shrubs	Suburba	an 4 pt	Vegetated Banks	3 p	∐ ∵
8 pt	A Rock Through/	4 pt Overgrown	1 pt Row Cr		Combination of Stabl and Eroding Banks	e	Partly
	Narrow (Can Throw A Rock Through/	3 pt	1 pt	2 pt	•	2 p	.
5 pt		Fenced Past	ure Open P	Pasture 0 pt	Raw, Collapsing Banks	0 p	None
	None	Park (Grass)	Lishan/	,			
0 pt		2 pt 4	0 pt			Soc	
	epth & Velocit		I I Obsessed	NI The FL	ow Turner The	Sco	
a)	Deepest Pool i	-1	b) Check A		ow Types Tha	wly Takes	None
8 pt	Chest Deep 4	Knee Deep		he Current	Objects Downs	stream 0 pt	
	Waist Deep	Ankle Deep	Fast: Quid	ckly Takes ownstream	Slow: Flow Nearly Absent		
6 pt			3 pt	hardanê Cant	1 pt	okho) Sc	ore: 6
	Riffles/Runs (A Riffles/Runs A	reas Where Curr			Substrates A	* / -	
a)	Knee Deep or	Ankle Deep Less & Slow	or	Fist Size or L		Smaller That	Your r Do Not Exist
8 pt	/	4 pt	7 p	t] Smaller Than	0 ρ Fist Size.	ot	
[<i>\frac{\lambda}{6}</i> pt	Ankle/Calf Deep & Fast	Do Not Exis	t 6 p	」 but Larger Th			later of the second sec
2 5.		•	- '	•			
							12024

Date: 4/5 C	itizens Qualitat	ive Habitat	Evaluation Ir	idex	42,5
Vol Site	/ River and			**	CQHEI Total
ID:ID:	, vacorono	d: May	Mittale 3		
I. Substrate (Bottom	Type)	I h) "Cmot	oving"	Score "Silting" (c	323
a) Size Mostly Large (Fist Size or Bigger)	Mostly Small (Smalle Than Fingernail, but 6 pt Coarse, or Bedrock)	Still Pieces NO Sands/	t Size and Larger Smothered By Silts?	Are Silts Distribute NO Stream? 5 pt Sympt	and Clays ad Throughout oms: Light Kicking
Mostly Medium (Smaller than Fist, but 10 pt Bigger than Fingernail) *II. Fish Cover (Hidin	Mostly Very Fine (No Coarse, Sometimes Greasy or Mucky)	YES Blac 0 pt Inse		YES Stream	om Results in intial Clouding of for More than a for Two
Underwater Tree Roots (Large) 2 Underwater Tree Rootlets (Fine)	pt 2 Backwaters, Oxbows or Side	Downed Trees, Logs, Branches pt Shallow, Slow Areas for pt Small Fish	Water Plants 2 pt Deep Areas (Chest Deep)	2 pt	ndercut Banks hrubs, Small Trees at Hang Close ver the Bank
III. Stream Shape ar			No. 4	Scor	5; \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
a) "Curviness" or " 2 or More Good Bends 8 pt	Sinuousity" of Cha 1 or 2 Good Bends 6 pt	nnel b)	A Few Minor	Many M Change 6 pt natural (e.g., tre	lan-made s, but still some conditions left ses, meanders) Man-made
Mostly Straight Some "Wiggle" 3 pt IV. Stream Forests &	Very Straight O pt Wetlands (Riparia	n Area) & Fros	streambank changes)	0 pt orchain	s (e.g., leveed nelized)
a) Width of	b) Lánd Use - Mos		c) Bank Erosion	-	Much of
Riparian Forest & Wetland - Mostly: Wide (Can't Throw A Rock Through/ Across It) Narrow (Can Throw A Rock Through/ A Rock Through/ 5 pt Across It) None O pt V. Depth & Velocity	Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt	Conservation Tillage Suburban pt Row Crop pt Open Pasture	Typically: Stable Hard or Well- Vegetated Banks Combination of Stab and Eroding Banks Path Raw, Collapsing Banks	Strean 3 pt	is Shaded? Mostly Partly None
a) Deepest Pool is		Check ALL Th	e Flow Types Th		<u> </u>
Chest Deep 4 pt Waist Deep V 6 pt 0 pt	Ankle Deep Ankle Deep as Where Current is	Very Fast: Hard to Stand in the Current t Fast: Quickly Takes Objects Downstream	1 pt Moderate: Slo Objects Down Slow: Flow Nearly Absen	owly Takes nstream 0 pt	None
a) Riffles/Runs Are Knee Deep or Deeper & Fast Ankle/Calf Deep & Fast		b) Riffle/ Fist Siz 7 pt Smalle	Run Substrates A e or Larger Than Fist Size, ger Than	Smaller Than Fingernalis or	our

Date: 1/15	itizens Qualitativ	e Habitat Evaluation l	ndex
Vol Site	River and	melle (2 600E	CQHEI Total
ID: ID:	/ Watershed:		Soorci
I. Substrate (Bottor	n Type)	b) "Smothering"	Score: 😊 c) "Silting"
a) Size Mostly Large (Fist Size or Bigger) Mostly Medium	Mostly Small (Smaller Than Fingernail, but Still Coarse, or Bedrock) Mostly Very Fine (Not	Are Fist Size and Larger	Are Silts and Clays Distributed Throughout NO Stream? 5 pt Symptoms: Light Kicking of Bottom Results in
(Smaller than Fist, but 10 pt Bigger than Fingernail)	Coarse, Sometimes Opt Greasy or Mucky)	Large Pieces, Often Black on Bottom with Few Insects Test For Each One Present	Substantial Clouding of Stream for More than a Minute or Two
Underwater Tree Roots (Large) 2 pt Underwater Tree Rootlets (Fine)	Boulders 2 pt Backwaters, Oxbows or Side 2 pt Channels 2 pt	Downed Trees, Logs, Branches 8 hallow, Slow Areas for Small Fish Water Plants 2 pt Under Plants 2 pt Chest Deep Ones of the property of t	2 pt Shrubs, Small Trees that Hang Close Over the Bank
	nd Human Alterations	al hallow National In	Score: 3
a) "Curviness" or 2 or More Good Bends 8 pt	"Sinuousity" of Chann or 2 Good Bends or property of the pro	b) How Natural Is Mostly Natural 12 pt	Many Man-made Changes, but still some natural conditions left (e.g., trees, meanders)
Mostly Straight Some "Wiggle"	Very Straight	A Few Minor Man-made Changes 9 pt (e.g., a bridge, some streambank changes)	Heavy, Man-made Changes (e.g., leveed or channelized)
IV. Stream Forests	& Wetlands (Riparian /	_	Score: 16
a) Width of Riparian Forest & Wetland - Mostly: Wide (Can't Throw A Rock Through/ Across It) Narrow (Can Throw A Rock Through/ 5 pt Across It) None 0 pt C. S	b) Land Use - Mostly Forest/Wetland 5 pt 2 pt Shrubs 4 pt Overgrown Fields 1 pt Fenced Pasture 2 pt Park (Grass) 2 pt 0 pt	_	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt
a) Width of Riparian Forest & Wetland - Mostly: Wide (Can't Throw A Rock Through/ Across It) Narrow (Can Throw A Rock Through/ Across It) None O pt V. Depth & Velocity	b) Land Use - Mostly Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 1 pt Fenced Pasture 2 pt Park (Grass) 2 pt 0 pt	Conservation Tillage Suburban Row Crop Open Pasture Urban/ Industrial Conservation Typically: Stable Hard or Well Vegetated Banks Combination of Sta and Eroding Banks Raw, Collapsing Banks Opt	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt 2.5 Score: 5
a) Width of Riparian Forest & Wetland - Mostly: Wide (Can't Throw A Rock Through/ Across It) Narrow (Can Throw A Rock Through/ Across It) None O pt None O pt C. S V. Depth & Velocity a) Deepest Pool is Chest Deep 8 pt Waist Deep 6 pt O p	b) Land Use - Mostly Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 1 pt Fenced Pasture 2 pt Park (Grass) 2 pt O pt Ankle Deep Ankle Deep Forest/Wetland 2 pt 0 pt 0 pt 2 pt 0 pt	Conservation Tillage Suburban Row Crop Open Pasture Urban/ Industrial C) Bank Erosion Typically: Stable Hard or Well Vegetated Banks Combination of Sta and Eroding Banks Raw, Collapsing Banks Opt Bank Erosion Typically: Stable Hard or Well Vegetated Banks Combination of Sta and Eroding Banks Raw, Collapsing Banks Opt Bank Erosion Typically: Stable Hard or Well Vegetated Banks And Eroding Banks Opt Bank Erosion Typically: Stable Hard or Well Vegetated Banks Opt Bank Erosion Typically: Stable Hard or Well Vegetated Banks Opt Bank Erosion Typically: Stable Hard or Well Vegetated Banks Opt Bank Erosion Typically: Stable Hard or Well Vegetated Banks Opt Bank Erosion Typically: Stable Hard or Well Vegetated Banks Opt Bank Erosion Typically: Stable Hard or Well Vegetated Banks Opt Bank Erosion Typically: Stable Hard or Well Vegetated Banks Opt Bank Erosion Typically: Stable Hard or Well Vegetated Banks Opt Bank Erosion Typically: Stable Hard or Well Vegetated Banks And Eroding Banks Opt Banks Opt Bank Erosion Stable Hard or Well Vegetated Banks And Eroding Banks Opt Bank	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt 2.5 Score: 5 at You See (Add Points): None 0 pt
a) Width of Riparian Forest & Wetland - Mostly: Wide (Can't Throw A Rock Through/ Across It) Narrow (Can Throw A Rock Through/ Across It) None O pt None O pt C. S V. Depth & Velocity a) Deepest Pool is Chest Deep 8 pt Waist Deep 6 pt O p	b) Land Use - Mostly Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 1 pt Fenced Pasture 2 pt Park (Grass) 2 pt O pt At Least: Knee Deep Ankle Deep 3 pt Gas Where Current is Fa	Conservation Tillage Suburban Row Crop Open Pasture Urban/ Industrial Combination of Sta and Eroding Banks Raw, Collapsing Banks Typically: Stable Hard or Well Vegetated Banks Combination of Sta and Eroding Banks Raw, Collapsing Banks Opt April 1	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt 2.5 Score: 5 at You See (Add Points): owly Takes onstream 0 pt nt broken) Score: The stroken of th

Date: 니15	Citizens Qualit	tative Habita	t Evaluation Ir	idex 24 CQHEI Total
Vol D:	Site River Wate	and Burch	@ 600-E	OGITE FOU
I. Substrate (Bo	ttom Typo)			Score: O
	ittom rype)	I h) "Smo	thering"	c) "Silting"
a) Size Mostly Large (Fist Size or Bigg	Mostly Small (Sr Than Fingernail, 6 pt Coarse, or Bedr	maller Are I	Fist Size and Larger es Smothered By ds/Silts?	Are Silts and Clays Distributed Throughout Stream?
Mostly Medium (Smaller than Fis Bigger than Fing		mes YES BI	Imptoms: Hard to Move arge Pieces, Often ack on Bottom with Few sects	Symptoms: Light Kicking of Bottom Results in Substantial Clouding of Stream for More than a Minute or Two
II Fish Cover (h	Hiding Places) - Add	2 Points For Fac	h One Present	Score: 6
Underwater Tree		Downed Trees.	Water Plants	Undercut Banks
Roots (Large) 2 pt Underwater Tree Rootlets (Fine)	2 pt	Logs, Branches 2 pt Shallow, Slow Areas for 2 pt Small Fish	2 pt Deep Areas (Chest Deep)	2 pt Shrubs, Small Trees that Hang Close Over the Bank
III. Stream Shap	oe and Human Altera	tions		Score:
	or "Sinuousity" of C		o) How Natural Is 1	Γhe Site?
2 or More Good Bends	6 pt Good Bend		Mostly Natural 2 pt	Many Man-made Changes, but still some natural conditions left (e.g., trees, meanders)
Mostly Straight Some "Wiggle"	Very Straig	ght (A Few Minor Man-made Changes (e.g., a bridge, some streambank changes)	Heavy, Man-made Changes (e.g., leveed or channelized)
IV. Stream Fore	sts & Wetlands (Ripa	arian Area) & Ero	sion	Score: 8.9
IV. Stream Fore	ests & Wetlands (Ripa b) Land Use - N	_	sion c) Bank Erosion	
	b) Land Use - N	Mostly: Conservation		
a) Width of	b) Land Use - N Forest/Wetland tly: 5 pt	Conservation Tillage	c) Bank Erosion Typically: Stable Hard or Well-	d) How Much of Stream is Shaded?
a) Width of Riparian Fores Wetland - Mos	b) Land Use - N Forest/Wetland 5 pt Shrubs	Conservation Tillage 2 pt Suburban	c) Bank Erosion Typically:	d) How Much of Stream is Shaded?
a) Width of Riparian Fores Wetland - Mos	b) Land Use - N Forest/Wetland 5 pt Shrubs 4 pt Overgrown	Conservation Tillage	c) Bank Erosion Typically: Stable Hard or Well- Vegetated Banks 4 pt Combination of Stab	d) How Much of Stream is Shaded?
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thro A Rock Through Across It) Narrow (Can Thr	b) Land Use - Note that the set & Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt	Conservation Tillage 2 pt Suburban 1 pt Row Crop	c) Bank Erosion Typically: Stable Hard or Well- Vegetated Banks Combination of Stab and Eroding Banks	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thro A Rock Through 8 pt Across It)	b) Land Use - Note that the set & Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture	c) Bank Erosion Typically: Stable Hard or Well- Vegetated Banks 4 pt Combination of Stab and Eroding Banks Raw, Collapsing Banks	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thro A Rock Through Across It) Narrow (Can Through A Rock Through	b) Land Use - Note that the second set & Forest/Wetland 5 pt Shrubs Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture 0 pt Urban/	c) Bank Erosion Typically: Stable Hard or Well- Vegetated Banks 4 pt Combination of Stab and Eroding Banks Raw, Collapsing	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt
a) Width of Riparian Fores Wetland - Mos Wide (Can't Through A Rock Through Across It) Narrow (Can Through A Rock Through Across It)	b) Land Use - Note that the set & Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture 0 pt	c) Bank Erosion Typically: Stable Hard or Well- Vegetated Banks 4 pt Combination of Stab and Eroding Banks Raw, Collapsing Banks	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt
a) Width of Riparian Fores Wetland - Mos Wide (Can't Through A Rock Through A Rock Through A Rock Through Across It) Narrow (Can Through A Rock Through Across It) None O pt 2.5 V. Depth & Velo	b) Land Use - Note that the set & Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt 2 4	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture 0 pt Urban/ Industrial	c) Bank Erosion Typically: Stable Hard or Well- Vegetated Banks Combination of Stab and Eroding Banks Paw, Collapsing Banks Opt	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt Score: 5
a) Width of Riparian Fores Wetland - Mos Wide (Can't Through A Rock Through A Rock Through A Rock Through Across It) Narrow (Can Through A Rock Through Across It) None O pt 2.5 V. Depth & Velo	b) Land Use - Note that the set & Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt 2 4	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture 0 pt Urban/ Industrial	c) Bank Erosion Typically: Stable Hard or Well- Vegetated Banks Combination of Stab and Eroding Banks Paw, Collapsing Banks Opt	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thro A Rock Through Across It) Narrow (Can Thi A Rock Through Across It) None Opt 2:5	b) Land Use - Note that the set & Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt 2 4	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture 0 pt Urban/ Industrial 0 pt Very Fast: Hard to Stand in the Curre	c) Bank Erosion Typically: Stable Hard or Well- Vegetated Banks 4 pt Combination of Stab and Eroding Banks 2 pt Raw, Collapsing Banks 0 pt he Flow Types That Moderate: Slo Objects Down	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt Score: 5 at You See (Add Points): stream None
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thra A Rock Through Across It) Narrow (Can Thra A Rock Through A Rock T	b) Land Use - Note that the set & Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 7 overgrown Fields 7 overgrown Fields 8 pt Park (Grass) 2 pt 2 pt Ocity Olis At Least: Knee Deep 4 pt	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture 0 pt Urban/ Industrial 0 pt Very Fast: Hard to Stand in the Curre	c) Bank Erosion Typically: Stable Hard or Well- Vegetated Banks Combination of Stab and Eroding Banks Panks Raw, Collapsing Banks o pt he Flow Types That Moderate: Slo Objects Down	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt Score: 5 at You See (Add Points):
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thro A Rock Through Across It) Narrow (Can Through Across It) None Opt 2.5 V. Depth & Velo a) Deepest Pool Chest Deep 8 pt Waist Deep	b) Land Use - Note that the set & Forest/Wetland 5 pt Shrubs Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt 2 4 Ocity Ocity Ankle Deep Ankle Deep	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture 0 pt Urban/ Industrial 0 pt Very Fast: Hard to Stand in the Curre	c) Bank Erosion Typically: Stable Hard or Well- Vegetated Banks Combination of Stab and Eroding Banks Raw, Collapsing Banks o pt Rew, Collapsing Banks Slow: Flow Slow: Flow	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt At You See (Add Points): Stream 0 pt None
a) Width of Riparian Fores Wetland - Mos Wide (Can't Through A Rock Through A Ro	b) Land Use - Note that the set & Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt 2 4 Ocity Olis At Least: Knee Deep 4 pt Ankle Deep 0 pt	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture 0 pt Urban/ Industrial b) Check ALL T Very Fast: Hard to Stand in the Curre 2 pt Fast: Quickly Take Objects Downstrea	c) Bank Erosion Typically: Stable Hard or Well- Vegetated Banks Combination of Stab and Eroding Banks Raw, Collapsing Banks opt he Flow Types Tha Moderate: Sto Objects Down 1 pt Slow: Flow Nearly Absen	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt None Score: 5 at You See (Add Points): wy Takes stream 0 pt t
a) Width of Riparian Fores Wetland - Mos Wide (Can't Through A Rock Through A Ro	b) Land Use - Note that the set & Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt 2 4 Ocity Olis At Least: Knee Deep 4 pt Ankle Deep 0 pt 6 (Areas Where Current	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture 0 pt Urban/ Industrial 0 pt Very Fast: Hard to Stand in the Curre 2 pt Fast: Quickly Take Objects Downstrea 3 pt tis Fast/Turbulent	c) Bank Erosion Typically: Stable Hard or Well- Vegetated Banks Combination of Stab and Eroding Banks Raw, Collapsing Banks opt he Flow Types Tha Moderate: Sto Objects Down 1 pt Slow: Flow Nearly Absen	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt None why Takes why Takes why Takes on pt None t roken) Score: Are:
a) Width of Riparian Fores Wetland - Mos Wide (Can't Through 8 pt Across It) Narrow (Can Through 4 Rock Through 5 pt Across It) None 0 pt 2.5 V. Depth & Velo a) Deepest Pool Chest Deep 8 pt Waist Deep 6 pt VI. Riffles/Runs a) Riffles/Runs Knee Deep or	b) Land Use - Note that the set & Forest/Wetland 5 pt	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture 0 pt Urban/ Industrial 0 pt Very Fast: Hard to Stand in the Curre 2 pt Fast: Quickly Take Objects Downstrea t is Fast/Turbulen b) Riffle	c) Bank Erosion Typically: Stable Hard or Well- Vegetated Banks 4 pt Combination of Stab and Eroding Banks 2 pt Raw, Collapsing Banks 0 pt Raw, Collapsing Banks Objects Down 1 pt Slow: Flow Nearly Absen 1 pt Surface May Be B P/Run Substrates E/Run Substrates	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt None 0 pt None t roken) Score: 4 Smaller Than Your Fingernaits or Do Not Exist
a) Width of Riparian Fores Wetland - Mos Wide (Can't Through A Rock Through Across It) Narrow (Can Through A Rock Through A	b) Land Use - Note that the set & Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt 2 4 Ocity Olis At Least: Knee Deep 4 pt Ankle Deep 0 pt S (Areas Where Currents Are: Ankle Deep or Less & Slow	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture 0 pt Urban/ Industrial 0 pt Very Fast: Hard to Stand in the Curre 2 pt Fast: Quickly Take Objects Downstrea 3 pt tis Fast/Turbulen b) Riffle Fist S 7 pt Smal	c) Bank Erosion Typically: Stable Hard or Well- Vegetated Banks Combination of Stab and Eroding Banks Panks Raw, Collapsing Banks Opt Panks Slow: Flow Nearly Absen Size or Larger Gler Than Fist Size,	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt None 0 pt None t roken) Score: 4 Smaller Than Your Fingernaits or Do Not Exist
a) Width of Riparian Fores Wetland - Mos Wide (Can't Through 8 pt Across It) Narrow (Can Through Across It) None 0 pt 2.5 V. Depth & Velo a) Deepest Pool Chest Deep 8 pt Waist Deep 6 pt VI. Riffles/Runs a) Riffles/Runs English Ringe Deep or Deeper & Fast	b) Land Use - Note that the set & Forest/Wetland 5 pt	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture 0 pt Urban/ Industrial 0 pt Very Fast: Hard to Stand in the Curre 2 pt Fast: Quickly Take Objects Downstrea 3 pt tis Fast/Turbulen b) Riffle Fist S 7 pt Smal	c) Bank Erosion Typically: Stable Hard or Well- Vegetated Banks 4 pt Combination of Stab and Eroding Banks 2 pt Raw, Collapsing Banks O pt Moderate: Slo Objects Down 1 pt Slow: Flow Nearly Absen Size or Larger Cler Than Fist Size, arger Than	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt None 0 pt None t roken) Score: 4 Smaller Than Your Fingernaits or Do Not Exist
a) Width of Riparian Fores Wetland - Mos Wide (Can't Through 8 pt Across It) Narrow (Can Through 5 pt Across It) None 0 pt 2.5 V. Depth & Velo a) Deepest Pool Chest Deep 8 pt Waist Deep 6 pt VI. Riffles/Runs a) Riffles/Runs Eneeper & Fast Ankie/Calf Deep & Fast	b) Land Use - Note that the set & Forest/Wetland 5 pt	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture 0 pt Urban/ Industrial 0 pt Very Fast: Hard to Stand in the Curre 2 pt Fast: Quickly Take Objects Downstrea 3 pt b) Riffle Fist S 7 pt Smal but L	c) Bank Erosion Typically: Stable Hard or Well- Vegetated Banks 4 pt Combination of Stab and Eroding Banks 2 pt Raw, Collapsing Banks O pt Moderate: Slo Objects Down 1 pt Slow: Flow Nearly Absen Size or Larger Cler Than Fist Size, arger Than	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt None 0 pt None t roken) Score: 4 Smaller Than Your Fingernaits or Do Not Exist

Date: リルム	Cit	izens Qu	alitative	: Habita	t Evaluation	ndex	38
111_2							CQHEI Total
Vol ID:	Site		River and Watershed:	Dana	il Banke	4505	- 1
I. Substrate (Bo	ottom I	vne)				Sco	re:
a) Size	otto III I	ypo,		Lb) "Smo	thering"	c) "Silting	
Mostly Large		Mostly Sm	all (Smaller	Are I	Fist Size and Larger	Are Silt	s and Clays
(Fist Size or Big	ger)		ernàil, but Still		es Smothered By ds/Silts?	│ │ Distrib	ited Throughout
in pr		J 7 303,00, 01	D04,001,	5 pt		5 pt	ptoms: Light Kicking
Mostly Medium	ind but	Mostly Very Coarse, So	y Fine (Not	Sy La	mptoms: Hard to Move	of Bo	ottom Results in stantial Clouding of
L (Smaller than Fi 10 pt Bigger than Fing		0 pt Greasy or	Mucky)		ack on Bottom with Few sects	YES Stream	am for More than a te or Two
			3				
II. Fish Cover (Hiding	Places) - A	dd 2 Point	s For Eac	h One Present	Sco	re: 8
Underwater Tree Roots (Large)	е 🗌	Boulders		Downed Trees, Logs, Branches	Water Pla	ents 🔲	Undercut Banks
2 pt Underwater Tre	2 pt	Backwaters.	2 pt	Shallow, Slow	2 pt Deep Are	as 2 pt	Shrubs, Small Trees
Rootlets (Fine)	2 pt	Oxbows or Side		Areas for Small Fish	(Chest De	eep)	that Hang Close Over the Bank
III. Stream Sha					·	Sco	
a) "Curviness"					o) How Natural I		777
2 or More	0, 0	1 or 2	2		/		
Good Bends 8 pt		Good 6 pt	Bends		Mostly Natural	Chang	Man-made ges, but still some
				1	2 pt	6 pt natura (e.g., t	al conditions left trees, meanders)
	<u> </u>			- .			
Mostly Straight		Very :	Straight		A Few Minor Man-made Change	es 🕍 Chand	/, Man-made ges (e.g., leveed
Some "Wiggle"		0 pt			9 pt (e.g., a bridge, sor streambank chang		innelized)
		1.5		<u>.</u>		6	
IV. Stream Fore	ests &	Wetlands (F	Riparian A	rea) & Erc	sion	Sco	re: 12.5
IV. Stream Fore a) Width of		Wetlands (F b) Land Use	e - Mostly:	1	c) Bank Erosic	on - 📘 d) How	/ Much of
a) Width of Riparian Fore	st &	b) Land Use	e - Mostly:			on - 📘 d) How	811
a) Width of	st &	b) Land Use Forest/Wetl	e - Mostly:	Conservation Tillage	c) Bank Erosic Typically:	on - d) How Strea	Much of m is Shaded?
a) Width of Riparian Fore: Wetland - Mos	st & stly:	b) Land Use	e - Mostly:	Conservation	C) Bank Erosic Typically: Stable Hard or Vegetated Bank	on - d) How Strea Vell- s	Much of m is Shaded?
a) Width of Riparian Fore Wetland - Mos	st & stly:	b) Land Use 1. Forest/Wetl 5 pt Shrubs	e - Mostly: and 2 pt 1 pt	Conservation Tillage	C) Bank Erosic Typically: Stable Hard or Vogetated Bank Combination of and Eroding Bar	on - d) How Strea Vell-s Stable	Much of m is Shaded?
a) Width of Riparian Fore Wetland - Mos Wide (Can't Thr A Rock Through	st & stly:	b) Land Use Forest/Wetl 5 pt Sprubs 4 pt Overgrown Fields	e - Mostly: and 2 pt 1 pt 1 pt	Conservation Tillage Suburban Row Crop	C) Bank Erosic Typically: Stable Hard or V Vegetated Bank Combination of	on - d) How Strea Veil- s Stable	Much of m is Shaded? Mostly Partly
a) Width of Riparian Fore Wetland - Mos Wide (Can't Thr A Rock Through Across It) Narrow (Can Th	st & stly: row h/	b) Land Use Forest/Wetl 5 pt Shrubs 4 pt Overgrown Fields	e - Mostly: and 2 pt 1 pt 1 pt	Conservation Tillage Suburban	C) Bank Erosic Typically: Stable Hard or V Vegetated Bank Combination of and Eroding Bank	on - d) How Strea Veil- s Stable	Much of m is Shaded?
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thr A Rock Through Across It) Narrow (Can Th A Rock Through Across It) None	st & stly: row h/	b) Land Use Forest/Wetl 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pas	e - Mostly: and 2 pt 1 pt 1 pt 5 ture 0 pt	Conservation Tillage Suburban Row Crop	C) Bank Erosic Typically: Stable Hard or Vegetated Bank 4 pt Combination of and Eroding Bank Raw, Collapsing Banks	on - d) How Strea Veil- s Stable	Much of m is Shaded? Mostly Partly None
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thr A Rock Through Across It) Narrow (Can Th A Rock Through Across It) None 0 pt 4	st & stly: row h/	b) Land Use Forest/Wetl 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pas	e - Mostly: and 2 pt 1 pt 1 pt 5 ture 0 pt	Conservation Tillage Suburban Row Crop / Open Pasture Urban/	C) Bank Erosic Typically: Stable Hard or Vegetated Bank 4 pt Combination of and Eroding Bank Raw, Collapsing Banks	on - d) How Strea Vell- s Stable nks 2 pt	Much of m is Shaded? Mostly Partly None
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thr A Rock Through A Rock T	st & stly: row h/ hrow h/	b) Land Use Forest/Wetl 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pas 2 pt Park (Grass 2 pt	e - Mostly: and 2 pt 1 pt 1 pt sture 0 pt s) 0 pt	Conservation Tillage Suburban Row Crop / Open Pasture Urban/ Industrial	C) Bank Erosic Typically: Stable Hard or Vegetated Bank Vegetated Bank Combination of and Eroding Bank 2 pt Raw, Collapsing Banks	on - d) How Stream Veil- s Stable piks 2 pt 0 pt	Much of m is Shaded? Mostly Partly None
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thr A Rock Through Across It) Narrow (Can Tr A Rock Through Across It) None O pt V. Depth & Vel a) Deepest Po	st & stly: row h/ hrow h/ ocity	b) Land Use Forest/Wetl 5 pt Sprubs 4 pt Overgrown Fields 3 pt Fenced Pas 2 pt Park (Grass 2 pt	e - Mostly: and 2 pt 1 pt 1 pt 0 pt sture 3 0 pt	Conservation Tillage Suburban Row Crop / Open Pasture Urban/ Industrial	C) Bank Erosic Typically: Stable Hard or Vogetated Bank Combination of and Eroding Bank Raw, Collapsing Banks Opt	on - d) How Stream Veil- s Stable piks 2 pt 0 pt	Much of m is Shaded? Mostly Partly None 1.5 Te: 3 (Add Points):
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thr A Rock Through Across It) Narrow (Can Tr A Rock Through Across It) None O pt V. Depth & Vel a) Deepest Po Chest Deep	st & stly: row h/ hrow h/ ocity ool is A	b) Land Use Forest/Wetl 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pas 2 pt Park (Grass 2 pt	e - Mostly: and 2 pt 1 pt 1 pt 0 pt sture 3 0 pt	Conservation Tillage Suburban Row Crop / Open Pasture Urban/ Industrial	C) Bank Erosic Typically: Stable Hard or Vegetated Bank 4 pt Combination of and Eroding Banks Raw, Collapsing Banks 0 pt he Flow Types Moderate	on - d) How Stream Vell-s Stable 2 pt O pt Sco That You See	Much of m is Shaded? Mostly Partly None
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thr A Rock Through Across It) Narrow (Can Tr A Rock Through Across It) None 0 pt 4 V. Depth & Vel a) Deepest Po	st & stly: row h/ hrow h/ ocity ool is A	b) Land Use Forest/Wetl 5 pt Sprubs 4 pt Overgrown Fields 3 pt Fenced Pas 2 pt Park (Grass 2 pt	e - Mostly: and 2 pt 1 pt 1 pt 5 o pt 5 o pt 5 c pt Comparison 1 pt 2 pt 5 pt 5 pt 6 pt 7 pt 8 pt 9 pt 1 pt 1 pt 1 pt 1 pt 2 pt 5 pt Fa	Conservation Tillage Suburban Row Crop / Open Pasture Urban/ Industrial CCK ALL T rry Fast: Hard to and in the Curre st: Quickly Take	C) Bank Erosic Typically: Stable Hard or Vegetated Bank Vegetated Bank 4 pt Combination of and Eroding Banks 2 pt Raw, Collapsing Banks 0 pt he Flow Types Moderate Objects Days Slow: Flow Flow Flow Flow Slow: Flow Flow Flow Flow Flow Flow Flow Flow	On - d) How Stream Veil- s Stable piks 2 pt	Much of m is Shaded? Mostly Partly None 1.5 Te: 3 (Add Points):
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thr A Rock Through A Rock T	st & stly: row h/ ocity ool is A	b) Land Use Forest/Wetl 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pas 2 pt Park (Grass 2 pt Least: Knee Deep Ankle Deep	b) Che b) Che 2 pt 1 pt 1 pt 0 pt 5 to pt 2 pt 5 to pt 5 to pt 6 to pt 7 to pt 8 to pt 9 to pt 1 pt 1 pt 1 pt 1 pt 1 pt 2 pt 5 to pt 6 to pt 7 to pt 8 to pt 9	Conservation Tillage Suburban Row Crop Open Pasture Urban/ Industrial eck ALL T rry Fast: Hard to and in the Curre list: Quickly Take ojects Downstres	C) Bank Erosic Typically: Stable Hard or Vegetated Bank Vegetated Bank Combination of and Eroding Banks Raw, Collapsing Banks Opt Results Stable Hard or Vegetated Bank Combination of and Eroding Bank Raw, Collapsing Banks Opt Raw, Collapsing Banks Stable Hard or Vegetated Bank Stable Hard or Vegetated	On - d) How Stream Vell-s Stable 2 pt O pt Sco That You See Slowly Takes O pt w osent	Much of m is Shaded? Mostly Partly None 1.5 (Add Points): None
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thr A Rock Through Across It) Narrow (Can Tr A Rock Through Across It) None Opt V. Depth & Vel a) Deepest Po Chest Deep 8 pt Waist Deep 6 pt VI. Riffles/Run	st & stly: row h/ hrow h/ ocity ool is A 4 pt 4 pt 6 pt	b) Land Use Forest/Wetl 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pas 2 pt Park (Grass 2 pt Least: Knee Deep Ankle Deep	b) Che b) Che 2 pt 1 pt 1 pt 0 pt 5 to pt 2 pt 5 to pt 5 to pt 6 to pt 7 to pt 8 to pt 9 to pt 1 pt 1 pt 1 pt 1 pt 1 pt 2 pt 5 to pt 6 to pt 7 to pt 8 to pt 9	Conservation Tillage Suburban Row Crop / Open Pasture Urban/ Industrial eck ALL T rry Fast: Hard to and in the Curre ast: Quickly Take objects Downstreat/Turbulent	C) Bank Erosic Typically: Stable Hard or Vegetated Bank Vegetated Bank 4 pt Combination of and Eroding Bank 2 pt Raw, Collapsing Banks 0 pt Moderate Objects Dank 1 pt Slow: Flow Nearly At 1 pt Surface May Be	On - d) How Stream Veil- Stable piks Stable piks Sco That You See : Slowly Takes pownstream O pt words and the stable piks Broken) Sco	Much of m is Shaded? Mostly Partly None 1.5 (Add Points): None
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thr A Rock Through Across It) Narrow (Can Th A Rock Through Across It) None Opt V. Depth & Vel a) Deepest Po Chest Deep 8 pt Waist Deep 6 pt VI. Riffles/Run a) Riffles/Run	st & stly: row h/ hrow h/ ocity ool is A 4 pt 4 pt 6 pt	b) Land Use Forest/Wetl 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pas 2 pt Park (Grass 2 pt Least: Knee Deep Ankle Deep	b) Che 2 pt 3 pt 5 pt 1 pt 1 pt 0 pt 8 ye 2 pt 2 pt Fa 3 pt rrent is Fas	Conservation Tillage Suburban Row Crop Open Pasture Urban/ Industrial CK ALL T Try Fast: Hard to and in the Curre st: Quickly Take ojects Downstre: (/Turbulent b) Riffle	C) Bank Erosic Typically: Stable Hard or Vegetated Bank 4 pt Combination of and Eroding Banks Raw, Collapsing Banks Opt Residual Moderate Objects I pt Slow: Flow Nearly Att The Surface May Bee/Run Substrate	Veil- Strea Veil- Stable Piks Stable Opt Sco That You See Slowly Takes Oownstream Opt w seent Broken) Sco Smaller Tham	Much of m is Shaded? Mostly Partly None Add Points): None
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thr A Rock Through Across It) Narrow (Can Tr A Rock Through Across It) None Opt V. Depth & Vel a) Deepest Po Chest Deep 8 pt Waist Deep 6 pt VI. Riffles/Run	st & stly: row h/ hrow h/ ocity ool is A 4 pt 4 pt 7 po pt A pt	b) Land Use Forest/Wetl 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pas 2 pt Park (Grass 2 pt t Least: Knee Deep Ankle Deep	b) Che b) Che 2 pt 1 pt 1 pt 0 pt sture 2 pt 4 pt 5 pt 7 pt 8 pt 1 pt 9 pt 1 pt 1 pt 9 pt 1 pt 9 pt 1 pt 1 pt 1 pt 9 pt 1 pt 9 pt 1 pt 2 pt 5 pt 7 pt 7 pt 8 pt 9	Conservation Tillage Suburban Row Crop Open Pasture Urban/ Industrial CK ALL T Try Fast: Hard to and in the Curre st: Quickly Take ojects Downstre: (/Turbulent b) Riffle	C) Bank Erosic Typically: Stable Hard or Vegetated Bank Vegetated Bank 4 pt Combination of and Eroding Bank 2 pt Raw, Collapsing Banks 0 pt Moderate Objects Dank 1 pt Slow: Flow Nearly At 1 pt Surface May Be	Veil- Strea Veil- Stable Piks Stable Opt Sco That You See Slowly Takes Oownstream Opt w seent Broken) Sco Smaller Tham	Much of m is Shaded? Mostly Partly None 1.5 (Add Points): None
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thr A Rock Through Across It) Narrow (Can Th A Rock Through Across It) None Opt V. Depth & Vel a) Deepest Po Chest Deep 8 pt Waist Deep 6 pt VI. Riffles/Run A Riffles/Run A Riffles/Run Ankle/Calf	st & stly: row h/ hrow h/ ocity ool is A 4 pt 4 pt 7 po pt A pt	b) Land Use Forest/Wetl 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pas 2 pt Park (Grass 2 pt t Least: Knee Deep Ankle Deep Ankle Deep Less & Slo	b) Che b) Che 2 pt 1 pt 1 pt 0 pt sture 3 0 pt 7 rent is Fas	Conservation Tillage Suburban Row Crop / Open Pasture Urban/ Industrial eck ALL T rry Fast: Hard to and in the Curre ist: Quickly Take ojects Downstreat t/Turbulent b) Riffle	C) Bank Erosic Typically: Stable Hard or Vegetated Bank 4 pt Combination of and Eroding Banks Raw, Collapsing Banks Opt Residual Moderate Objects I pt Slow: Flow Nearly Att The Surface May Bee/Run Substrate	Stream Vell- Stable Relative Stream Vell-	Much of m is Shaded? Mostly Partly None Add Points): None
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thr A Rock Through Across It) Narrow (Can Tr A Rock Through Across It) None O pt V. Depth & Vel a) Deepest Po Chest Deep 8 pt Waist Deep 6 pt VI. Riffles/Run A Riffles/Run Knee Deep or Deeper & Fast	st & stly: row h/ hrow h/ ocity ool is A 4 pt 4 pt 7 po pt A pt	b) Land Use Forest/Wetl 5 pt Sprubs 4 pt Overgrown Fields 3 pt Fenced Pas 2 pt Park (Grass 2 pt t Least: Knee Deep Ankle Deep Ankle Deep Less & Slo	b) Che b) Che 2 pt 1 pt 1 pt 0 pt sture 3 0 pt 7 rent is Fas	Conservation Tillage Suburban Row Crop Open Pasture Urban/ Industrial eck ALL T ry Fast: Hard to and in the Curre st: Quickly Take ojects Downstrea t/Turbulen b) Riffle Fist 5 7 pt Smal	C) Bank Erosic Typically: Stable Hard or Vegetated Bank 4 pt Combination of and Eroding Bank 2 pt Raw, Collapsing Banks 0 pt He Flow Types Moderate Objects 1 pt Slow: Flo Nearly At 1 pt Surface May Be E/Run Substrate Size or Larger Iller Than Fist Size, arger Than	Stream Vell- Stable Relative Stream Vell-	Much of m is Shaded? Mostly Partly None Add Points): None
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thr A Rock Through Across It) Narrow (Can Tr A Rock Through 5 pt Across It) None 0 pt V. Depth & Vel a) Deepest Po Chest Deep 8 pt Waist Deep 6 pt VI. Riffles/Run Ankle/Calf Deep & Fast Deep & Fast	st & stly: row h/ hrow h/ ocity ool is A 4 pt 4 pt 7 po pt A pt	b) Land Use Forest/Wetl 5 pt Sprubs 4 pt Overgrown Fields 3 pt Fenced Pas 2 pt Park (Grass 2 pt Least: Inge Deep Ankle Deep Ankle Deep Less & Slo 4 pt Do Not Exi	b) Che b) Che 2 pt 1 pt 1 pt 0 pt sture 3 0 pt 7 rent is Fas	Conservation Tillage Suburban Row Crop Open Pasture Urban/ Industrial CCK ALL T Try Fast: Hard to and in the Curre ast: Quickly Take ojects Downstreat Urbulent b) Riffle T pt Small Small But L	C) Bank Erosic Typically: Stable Hard or Vegetated Bank 4 pt Combination of and Eroding Bank 2 pt Raw, Collapsing Banks 0 pt He Flow Types Moderate Objects 1 pt Slow: Flo Nearly At 1 pt Surface May Be E/Run Substrate Size or Larger Iller Than Fist Size, arger Than	Stream Vell- Stable Relative Stream Vell-	Much of m is Shaded? Mostly Partly None (Add Points): None
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thr A Rock Through Across It) Narrow (Can Tr A Rock Through 5 pt Across It) None 0 pt V. Depth & Vel a) Deepest Po Chest Deep 8 pt Waist Deep 6 pt VI. Riffles/Run Ankle/Calf Deep & Fast Deep & Fast	st & stly: row h/ hrow h/ ocity ool is A 4 pt 4 pt 7 po pt A pt	b) Land Use Forest/Wetl 5 pt Sprubs 4 pt Overgrown Fields 3 pt Fenced Pas 2 pt Park (Grass 2 pt Least: Inge Deep Ankle Deep Ankle Deep Less & Slo 4 pt Do Not Exi	b) Che b) Che 2 pt 1 pt 1 pt 0 pt sture 3 0 pt 7 rent is Fas	Conservation Tillage Suburban Row Crop Open Pasture Urban/ Industrial CCK ALL T Try Fast: Hard to and in the Curre ast: Quickly Take ojects Downstreat Urbulent b) Riffle T pt Small Small But L	C) Bank Erosic Typically: Stable Hard or Vegetated Bank 4 pt Combination of and Eroding Bank 2 pt Raw, Collapsing Banks 0 pt He Flow Types Moderate Objects 1 pt Slow: Flo Nearly At 1 pt Surface May Be E/Run Substrate Size or Larger Iller Than Fist Size, arger Than	Stream Vell- Stable Relative Stream Vell-	Much of m is Shaded? Mostly Partly None (Add Points): None

Date: 4/5	itizens Qualitati	ive Habitat	Evaluation In	Idex 18.5
Vol Site ID:	River and Watershed	d: Black (reck @ 4:	Ø.5
I. Substrate (Botton	1 Type)			Score: O
a) Size		b) "Smoth	nering"	c) "Silting"
Mostly Large (Fist Size or Bigger)	Mostly Small (Smaller Than Fingernail, but S 6 pt Coarse, or Bedrock)		t Size and Larger Smothered By Silts?	Are Silts and Clays Distributed Throughout NO Stream? 5 pt
Mostly Medium (Smaller than Fist, but 10 pt Bigger than Fingernail)	Mostly Very Fine (Not Coarse, Sometimes 0 pt Greasy or Mucky)	` Largi	ptoms: Hard to Move e Pieces, Often k on Bottom with Few cts	Symptoms: Light Kicking of Bottom Results in Substantial Clouding of Stream for More than a Minute or Two
II. Fish Cover (Hidir	ng Places) - Add 2 Po	oints For Each	One Present	Score: 4
Underwater Tree Rootlets (Fine)	Backwaters, Oxbows or Side	Downed Trees, Logs, Branches Shallow, Slow Areas for Small Fish	Water Plants 2 pt Deep Areas (Chest Deep)	2 pt Shrubs, Small Trees that Hang Close Over the Bank
	nd Human Alteration			Score:
a) "Curviness" or '	"Sinuousity" of Chai	nnei b)	How Natural Is 1	81. 81.
8 pt Good Bends	Good Bends	12 1	Mostly Natural ot	Many Man-made Changes, but still some natural conditions left (e.g., trees, meanders)
Mostly Straight Some "Wiggle"	Very Straight	9 p	A Few Minor Man-made Changes t (e.g., a bridge, some streambank changes)	Heavy, Man-made Changes (e.g., leveed or channelized)
		2		
IV. Stream Forests	& Wetlands (Riparia	n Area) & Eros	ion	Score: SS
a) Width of	b) Land Use - Mos	tly:) Bank Erosion	d) How Much of
a) Width of Riparian Forest & Wetland - Mostly: Wide (Can't Throw A Rock Through/ 8 pt Across It) Narrow (Can Throw A Rock Through/ 5 pt Across It)	b) Land Use - Mos Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture	Conservation Tillage pt Suburban pt Row Crop pt Open Pasture		d) How Much of Stream is Shaded?
a) Width of Riparian Forest & Wetland - Mostly: Wide (Can't Throw A Rock Through/ Across It) Narrow (Can Throw A Rock Through/	b) Land Use - Mos Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass)	Conservation Tillage pt Suburban pt Row Crop pt Open Pasture pt Urban/ Industrial	Stable Hard or Well-Vegetated Banks Combination of Stab and Eroding Banks Raw, Collapsing Banks	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None
a) Width of Riparian Forest & Wetland - Mostly: Wide (Can't Throw A Rock Through/ 8 pt Across It) Narrow (Can Throw A Rock Through/ Aeross It) None	b) Land Use - Mos Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt 0	Conservation Tillage pt Suburban pt Row Crop pt Open Pasture pt Urban/	Stable Hard or Well-Vegetated Banks Combination of Stab and Eroding Banks Raw, Collapsing Banks	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None
a) Width of Riparian Forest & Wetland - Mostly: Wide (Can't Throw A Rock Through/ Across It) Narrow (Can Throw A Rock Through/ Aeross It) None O'pt	b) Land Use - Mos Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 7 pt Park (Grass) 2 pt 0	Conservation Tillage pt Suburban pt Row Crop pt Open Pasture pt Urban/ Industrial pt Check ALL The	Stable Hard or Well-Vegetated Banks Combination of Stab and Eroding Banks Raw, Collapsing Banks pt Raw, Collapsing Banks The Flow Types The	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt Score: 5 at You See (Add Points):
a) Width of Riparian Forest & Wetland - Mostly: Wide (Can't Throw A Rock Through/ Across It) Narrow (Can Throw A Rock Through/ 5 pt Aeross It) None O'pt' V. Depth & Velocity	b) Land Use - Mos Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 7 pt Park (Grass) 2 pt 0	conservation Tillage pt Suburban pt Row Crop pt Open Pasture pt Urban/ Industrial pt Check ALL The Very Fast: Hard to Stand in the Current Fast: Quickly Takes Objects Downstream	Stable Hard or Well-Vegetated Banks Combination of Stable Hard or Well-Vegetated Banks Combination of Stable Hard or Well-Vegetated Banks Raw, Collapsing Banks Popt Raw, Collapsing Banks Popt Raw, Collapsing Banks Slow: Flow Slow: Flow Slow: Flow	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt Score: At You See (Add Points): None O pt
a) Width of Riparian Forest & Wetland - Mostly: Wide (Can't Throw A Rock Through/ 8 pt Across It) Narrow (Can Throw A Rock Through/ 5 pt Aeross It) None O'pt' V. Depth & Velocity a) Deepest Pool is Chest Deep 8 pt 4 pt Waist Deep 6 pt VI. Riffles/Runs (Ar	b) Land Use - Mos Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 7 Park (Grass) 2 pt Park (Grass) 2 pt Ankle Deep eas Where Current is	Conservation Tillage pt Suburban pt Row Crop pt Open Pasture pt Urban/ Industrial pt Check ALL The Very Fast: Hard to Stand in the Current Fast: Quickly Takes Objects Downstream Fast/Turbulen	Stable Hard or Well-Vegetated Banks Combination of Stable Hard or Well-Vegetated Banks Combination of Stable Hard or Well-Vegetated Banks Raw, Collapsing Banks Raw, Collapsing Banks Pit Moderate: Stable Hard or Well-Vegetated Banks Raw, Collapsing Banks Stable Hard or Well-Vegetated Banks Raw, Collapsing Banks Stable Hard or Well-Vegetated Banks Raw, Collapsing Banks Stable Hard or Well-Vegetated Banks	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt None wly Takes Stream 0 pt t Token) Score: 4
a) Width of Riparian Forest & Wetland - Mostly: Wide (Can't Throw A Rock Through/ Across It) Narrow (Can Throw A Rock Through/ 5 pt Across It) None 0 pt V. Depth & Velocity a) Deepest Pool is Chest Deep 8 pt 4 pt Waist Deep 6 pt 0 pt	b) Land Use - Mos Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 7 Park (Grass) 2 pt Park (Grass) 2 pt Ankle Deep eas Where Current is	conservation Tillage pt Suburban pt Row Crop pt Open Pasture pt Urban/ Industrial pt Check ALL The Very Fast: Hard to Stand in the Current Fast: Quickly Takes Objects Downstream Fast/Turbulen Fist Size 7 pt Smaller	Stable Hard or Well-Vegetated Banks Combination of Stable Hard or Well-Vegetated Banks Combination of Stable Hard or Well-Vegetated Banks Raw, Collapsing Banks Raw, Collapsing Banks Popt Robjects Down 1 pt Slow: Flow Nearly Absen Surface May Be Be Run Substrates From Types The Moderate: Slo Objects Down Nearly Absen Surface May Be Be Run Substrates From Types The Objects Down Nearly Absen Surface May Be Be Run Substrates From Types The Moderate: Slo Objects Down Nearly Absen Surface May Be Be Run Substrates From Types The Objects Down Nearly Absen	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt None 0 pt None t Token) Score: 4 Smaller Than Your Fingernails or Do Not Exist

Date: 4/15	Citizens Quali	tative Habitat	Evaluation In	dex 44,5
Vol ID:		r and Black	Crook al	600E
				Score: 13.5
I. Substrate (Bo	ottom Type)	I 1 2 1/2		
a) Size	/	b) "Smot		c) "Silting"
Mostly Large (Fist Size or Bigg	ger) Mostly Small (S Than Fingernai 6 pt Coarse, or Bed	l, but Still Piece	ist Size and Larger s Smothered By s/Silts?	Are Silts and Clays Distributed Throughout Stream?
Mostly Medium (Smaller than Fig 10 pt Bigger than Fing		le (Not Syrimes YES Bla	mptoms: Hard to Move ge Pieces, Often ick on Bottom with Few ects	YES 0 pt Symptoms: Light Kicking of Bottom Results in Substantial Clouding of Stream for More than a Minute or Two
	in the state of th	1 Dainta Fay Faci	n One Brocent	Score: 8
	Hiding Places) - Add		TOHE Flesent	Undercut Banks
2 pt Underwater Tree Roots (Large) Underwater Tree Rootlets (Fine)	2 pt	Downed Trees, Logs, Branches 2 pt Shallow, Slow Areas for 2 pt Small Fish	Water Plants 2 pt Deep Areas (Chest Deep)	2 pt Shrubs, Small Trees that Hang Close Over the Bank
III. Stream Sha	pe and Human Altera	itions		Score: 3
a) "Curviness"	or "Sinuousity" of C	Channel b) How Natural Is 1	he Site?
2 or More Good Bends 8 pt	1 or 2 Good Ben	<u>-</u> <u> </u>	Mostly Natural	Many Man-made Changes, but still some 6 pt natural conditions left (e.g., trees, meanders)
Mostly Straight Some "Wiggle"	Very Straig	ght 9	A Few Minor Man-made Changes (e.g., a bridge, some streambank changes)	Heavy, Man-made Changes (e.g., leveed 0 pt or channelized)
				- g1,
W Change Fore	nata 9 Matlanda /Din	arian Araal & Era	cion	Score 12
	ests & Wetlands (Ripa			Score: 12
a) Width of	b) Land Use - I	Mostly:	c) Bank Erosion	d) How Much of
a) Width of Riparian Fores	b) Land Use - I	Mostly: Conservation Tillage		
a) Width of	b) Land Use - I St & Forest/Wetland 5 pt	Mostly: Conservation Tillage	c) Bank Erosion · Typically: Stable Hard or Well-	d) How Much of
a) Width of Riparian Fores	b) Land Use - I Forest/Wetland 5 pt Shrubs	Mostly: Conservation Tillage 2 pt Suburban	c) Bank Erosion - Typically:	d) How Much of Stream is Shaded?
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thro A Rock Through	b) Land Use - I Forest/Wetland	Mostly: Conservation Tillage 2 pt Suburban 1 pt	c) Bank Erosion Typically: Stable Hard or Well- Vegetated Banks 4 pt Combination of Stab	d) How Much of Stream is Shaded?
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thro A Rock Through 8 pt Across It)	b) Land Use - I Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields	Conservation Tillage 2 pt Suburban 1 pt Row Crop	c) Bank Erosion Typically: Stable Hard or Well- Vegetated Banks	d) How Much of Stream is Shaded?
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thr A Rock Through Across It) Narrow (Can Th A Rock Through	b) Land Use - I Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields	Conservation Tillage 2 pt Suburban 1 pt Row Crop	c) Bank Erosion Typically: Stable Hard or Well- Vegetated Banks 4 pt Combination of Stab and Eroding Banks 2 pt Raw, Collapsing	d) How Much of Stream is Shaded?
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thr A Rock Through A cross It) Narrow (Can Th A Rock Through 5 pt Across It)	b) Land Use - I Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture 0 pt	c) Bank Erosion Typically: Stable Hard or Well- Vegetated Banks 4 pt Combination of Stab and Eroding Banks	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thr A Rock Through A Rock Through A Rock Through 5 pt Across It) None	b) Land Use - I Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass)	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture 0 pt Urban/ Industrial	C) Bank Erosion Typically: Stable Hard or Well- Vegetated Banks 4 pt Combination of Stab and Eroding Banks 2 pt Raw, Collapsing Banks	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thr A Rock Through Across It) Narrow (Can Th A Rock Through 5 pt Across It) None 0 pt	b) Land Use - I Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 7 Fenced Pasture 2 pt Park (Grass) 2 pt 3	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture 0 pt Urban/	C) Bank Erosion Typically: Stable Hard or Well- Vegetated Banks 4 pt Combination of Stab and Eroding Banks 2 pt Raw, Collapsing Banks	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thr A Rock Through A Rock Through A Rock Through A Rock Through Narrow (Can Th A Rock Through None O pt V. Depth & Velo	b) Land Use - I Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt 3	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture 0 pt Urban/ Industrial 0 pt	C) Bank Erosion Typically: Stable Hard or Well- Vegetated Banks 4 pt Combination of Stab and Eroding Banks 2 pt Raw, Collapsing Banks	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thr A Rock Through Across It) Narrow (Can Th A Rock Through 5 pt Across It) None 0 pt	b) Land Use - I Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt Socity Follis At Least:	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture 0 pt Urban/ Industrial b) Check ALL Tr	C) Bank Erosion Typically: Stable Hard or Well- Vegetated Banks Combination of Stab and Eroding Banks Raw, Collapsing Banks D pt Reflow Types Tha	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt Score: 5 at You See (Add Points):
a) Width of Riparian Fores Wetland - Mos Wide (Can't Through A Rock Through A Arross It) None Opt V. Depth & Velo Chest Deep O Potest Deep	b) Land Use - I Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt Socity Folia At Least: Knee Deep	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture 0 pt Urban/ Industrial 0 pt Very Fast: Hard to Stand in the Curren	C) Bank Erosion Typically: Stable Hard or Well-Vegetated Banks 4 pt Combination of Stab and Eroding Banks Raw, Collapsing Banks 0 pt Reflow Types Than Moderate: Slo Objects Down	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt Score: 5 At You See (Add Points): wly Takes stream
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thr A Rock Through Across It) Narrow (Can Th A Rock Through A Cock Thro	b) Land Use - I Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt 5 ocity Folis At Least: Knee Deep	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture 0 pt Urban/ Industrial b) Check ALL Tr	C) Bank Erosion Typically: Stable Hard or Well-Vegetated Banks Combination of Stab and Eroding Banks Raw, Collapsing Banks Opt Reflow Types That Moderate: Slo Objects Down	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None Score: 5 At You See (Add Points): None
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thr A Rock Through Across It) Narrow (Can Th A Rock Through 5 pt Across It) None 0 pt V. Depth & Velo a) Deepest Po Chest Deep 8 pt Waist Deep	b) Land Use - I Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt 5 ocity Ankle Deep Ankle Deep	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture 0 pt Urban/Industrial 0 pt Very Fast: Hard to Stand in the Curren	C) Bank Erosion Typically: Stable Hard or Well- Vegetated Banks 4 pt Combination of Stab and Eroding Banks Raw, Collapsing Banks D pt Moderate: Slo Objects Down 1 pt Slow: Flow	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt At You See (Add Points): None 0 pt
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thr A Rock Through Across It) Narrow (Can Th A Rock Through 5 pt Across It) None 0 pt V. Depth & Velo a) Deepest Po Chest Deep 8 pt Waist Deep 6 pt	b) Land Use - I Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt 5 ocity Fark (Grass) Ankle Deep Ankle Deep O pt	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture 0 pt Urban/ Industrial b) Check ALL Tr Very Fast: Hard to Stand in the Curren 2 pt Fast: Quickly Takes Objects Downstrea	C) Bank Erosion Typically: Stable Hard or Well- Vegetated Banks Combination of Stab and Eroding Banks Raw, Collapsing Banks D pt Raw, Collapsing Banks Moderate: Slo Objects Down 1 pt Slow: Flow Nearly Absent	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt None O pt None O pt None
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thr A Rock Through Across It) Narrow (Can Th A Rock Through Across It) None O pt V. Depth & Velo a) Deepest Po Chest Deep 8 pt Waist Deep 6 pt VI. Riffles/Runs	b) Land Use - I Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt 3 Ocity Folis At Least: Knee Deep 4 pt Ankle Deep 0 pt S (Areas Where Curren	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture 0 pt Urban/Industrial 0 pt Very Fast: Hard to Stand in the Curren 2 pt Fast: Quickly Takes Objects Downstrea. 3 pt 1 is Fast/Turbulent.	Typically: Stable Hard or Well-Vegetated Banks Combination of Stab and Eroding Banks Raw, Collapsing Banks Definition of Stab and Eroding Banks Raw, Collapsing Banks Sopre Flow Types That Moderate: Slo Objects Down Nearly Absent 1 pt Slow: Flow Nearly Absent 1 pt Surface May Be British Stable Stable Stable Stable Hard or Well-Vegetated Banks	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt At You See (Add Points): wly Takes stream 0 pt Oken) Score: 3
a) Width of Riparian Fores Wetland - Mos Wide (Can't Through A Rock Through A Across It) Narrow (Can Th A Rock Through A Across It) None O pt V. Depth & Veice a) Deepest Po Chest Deep 8 pt Waist Deep 6 pt VI. Riffles/Runs Knee Deep or	b) Land Use - I Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt 3 Ocity Folis At Least: Knee Deep 4 pt Ankle Deep 0 pt S (Areas Where Currents S Are: Ankle Deep or	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture 0 pt Urban/Industrial b) Check ALL Tr Very Fast: Hard to Stand in the Curren 2 pt Fast: Quickly Takes Objects Downstrea t is Fast/Turbulent b) Riffle	C) Bank Erosion Typically: Stable Hard or Well- Vegetated Banks Combination of Stab and Eroding Banks Raw, Collapsing Banks D pt Raw, Collapsing Banks Moderate: Slo Objects Down 1 pt Slow: Flow Nearly Absent	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt None opt Are: Smaller Than Your
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thr A Rock Through Across It) Narrow (Can Th A Rock Through Across It) None O pt V. Depth & Velo a) Deepest Po Chest Deep 8 pt Waist Deep 6 pt VI. Riffles/Runs A Riffles/Runs Express Knee Deep or Deeper & Fast	b) Land Use - In Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt Socity ool is At Least: Knee Deep 4 pt Ankle Deep 0 pt S (Areas Where Currents Are:	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture 0 pt Urban/Industrial 0 pt Very Fast: Hard to Stand in the Curren 2 pt Fast: Quickly Takes Objects Downstrea 3 pt tis Fast/Turbulent b) Riffle Fist S	Stable Hard or Well-Vegetated Banks 4 pt Combination of Stab and Eroding Banks 2 pt Raw, Collapsing Banks 0 pt Raw, Collapsing Banks 0 pt Moderate: Slo Objects Down 1 pt Slow: Flow Nearly Absent Nearly Absent Surface May Be Book Run Substrates Vegetated Banks And Eroding Banks Surface May Be Book Vegetated Banks Note Types That Moderate: Slo Objects Down Nearly Absent Nearly Absent Vegetated Banks Note Types That Note Types Th	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt None 0 pt None Oken) Score: 3 Are: Smaller Than Your Fingernalis or Do Not Exist
a) Width of Riparian Fores Wetland - Mos Wide (Can't Through A Rock Through A Across It) Narrow (Can Th A Rock Through A Cross It) None O pt V. Depth & Velo a) Deepest Po Chest Deep 8 pt Waist Deep 6 pt VI. Riffles/Runs Ankle/Calf Deep & Fast Ankle/Calf Deep & Fast	b) Land Use - I Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt 3 Ocity Olis At Least: Knee Deep 4 pt Ankle Deep 0 pt S (Areas Where Currents Are: Ankle Deep or Less & Slow Do Not Exist	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture 0 pt Urban/ Industrial 0 pt Very Fast: Hard to Stand in the Curren 2 pt Fast: Quickly Takes Objects Downstrea 3 pt b) Riffle Fist S 7 pt Small but La	Stable Hard or Well-Vegetated Banks 4 pt Combination of Stab and Eroding Banks 2 pt Raw, Collapsing Banks 0 pt Raw, Collapsing Banks Objects Down 1 pt Slow: Flow Nearly Absent 1 pt Surface May Be Br Run Substrates Or	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt None 0 pt None Oken) Score: 3 Are: Smaller Than Your Fingernalis or Do Not Exist
a) Width of Riparian Fores Wetland - Mos Wide (Can't Thr A Rock Through Across It) Narrow (Can Th A Rock Through Across It) None Opt V. Depth & Vel a) Deepest Po Chest Deep 8 pt Waist Deep 6 pt VI. Riffles/Runs Ankle/Calf	b) Land Use - I Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt 3 Ocity Folia At Least: Knee Deep 4 pt Ankle Deep 0 pt Ankle Deep or Less & Slow Ankle Deep or Less & Slow	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture 0 pt Urban/ Industrial b) Check ALL Tr Very Fast: Hard to Stand in the Curren 2 pt Fast: Quickly Takes Objects Downstreal t is Fast/Turbulent b) Riffle Fist Si 7 pt Smalle	Stable Hard or Well-Vegetated Banks 4 pt Combination of Stab and Eroding Banks 2 pt Raw, Collapsing Banks 0 pt Raw, Collapsing Banks 0 pt Moderate: Slo Objects Down 1 pt Slow: Flow Nearly Absent Nearly Absent Surface May Be Br Run Substrates Ize or Larger Organizer Than Fist Size, Internally Stable Hard or Well-Vegetated Banks Option of Stab and Eroding Banks O	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt None 0 pt None Oken) Score: 3 Are: Smaller Than Your Fingernalis or Do Not Exist
a) Width of Riparian Fores Wetland - Mos Wide (Can't Through A Rock Through A Across It) Narrow (Can Th A Rock Through A Cross It) None O pt V. Depth & Velo a) Deepest Po Chest Deep 8 pt Waist Deep 6 pt VI. Riffles/Runs Ankle/Calf Deep & Fast Ankle/Calf Deep & Fast	b) Land Use - I Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt 3 Ocity Olis At Least: Knee Deep 4 pt Ankle Deep 0 pt S (Areas Where Currents Are: Ankle Deep or Less & Slow Do Not Exist	Conservation Tillage 2 pt Suburban 1 pt Row Crop 1 pt Open Pasture 0 pt Urban/ Industrial 0 pt Very Fast: Hard to Stand in the Curren 2 pt Fast: Quickly Takes Objects Downstrea 3 pt b) Riffle Fist S 7 pt Small but La	Stable Hard or Well-Vegetated Banks 4 pt Combination of Stab and Eroding Banks 2 pt Raw, Collapsing Banks 0 pt Raw, Collapsing Banks Objects Down 1 pt Slow: Flow Nearly Absent 1 pt Surface May Be Br Run Substrates Or	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt None 0 pt None Oken) Score: 3 Are: Smaller Than Your Fingernalis or Do Not Exist

	tizens Qualitati	ve Habitat l	Evaluation li	rdex SQHEI Total
Vol Site ID:	12 River and Watershed	Bhok Creek	Q 5005	
1D,				Score:
I. Substrate (Bottom	Type)	Lh) "Smoth	oring"	c) "Silting"
a) Size Mostly Large (Fist Size or Bigger)	Mostly Small (Smaller Than Fingernail, but S 6 pt Coarse, or Bedrock)		Size and Larger Smothered By	Are Silts and Clays Distributed Throughout NO Stream?
Mostly Medium (Smaller than Fist, but Bigger than Fingernall)	Mostly Very Fine (Not Coarse, Sometimes 0 pt Greasy or Mucky)	Large Large	toms: Hard to Move Pieces, Often on Bottom with Few ts	Symptoms: Light Kicking of Bottom Results in Substantial Clouding of Stream for More than a Minute or Two
II. Fish Cover (Hidin	g Places) - Add 2 Po	oints For Each	One Present	Score: 4
Underwater Tree Roots (Large) 2 pt 2 pt Underwater Tree Rootlets (Fine)	Boulders pt 2: Backwaters.	Downed Trees, Logs, Branches ot Shallow, Slow Areas for	2 pt Deep Areas (Chest Deep	Undercut Banks 2 pt Shrubs, Small Trees
III. Stream Shape an	d Human Alteration			Score:
a) "Curviness" or "	Sinuousity" of Char	nnel b)	How Natural is	The Site?
2 or More Good Bends	1 or 2 Good Bends	12 p	Mostly Natural t	Many Man-made Changes, but still some natural conditions left (e.g., trees, meanders)
Mostly Straight Some "Wiggle"	Very Straight	9 pt	A Few Minor Man-made Changes (e.g., a bridge, some streambank changes)	Heavy, Man-made Changes (e.g., leveed or channelized)
IV. Stream Forests 8	k Wetlands (Ripariar	n Area) & Erosi	on	Score: 6
a) Width of	b) Land Use - Most) Bank Erosion	- d) How Much of
Riparian Forest &	Forest/Wetland	Conservation Tillage	Typically:	Stream is Shaded?
			Otable Hand on Mall	
Wetland - Mostly:	5 pt 2	¬ • • • • • • • • • • • • • • • • • • •	Stable Hard or Well	Mostly
Wide (Can't Throw	Shrubs	Suburban 4	Vegetated Banks	Mostly 3 pt
•	Shrubs 4 pt 1 Overgrown	Suburban 4	vegetated Banks pt Combination of Stal	3 pt
Wide (Can't Throw A Rock Through/ 8 pt Across It) Narrow (Can Throw	Shrubs 4 pt Overgrown Fields 1	Suburban pt Row Crop 2	pt Vegetated Banks pt Combination of Stal and Eroding Banks	3 pt Partly
Wide (Can't Throw A Rock Through/ 8 pt Across It)	Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture	Suburban pt Row Crop pt Open Pasture	vegetated Banks pt Combination of Stal and Eroding Banks pt Raw, Collapsing Banks	3 pt
Wide (Can't Throw A Rock Through/ 8 pt Across It) Narrow (Can Throw A Rock Through/	Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Overgrown 0	Suburban pt Row Crop pt Open Pasture pt Urban/	vegetated Banks pt Combination of Stal and Eroding Banks pt Raw Collapsing	3 pt Partly
Wide (Can't Throw A Rock Through/ Across It) Narrow (Can Throw A Rock Through/ 5 pt Across It)	Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture	Suburban pt Row Crop pt Open Pasture pt Urban/ Industrial	vegetated Banks pt Combination of Stal and Eroding Banks pt Raw, Collapsing Banks	3 pt Partly
Wide (Can't Throw A Rock Through/ Across It) Narrow (Can Throw A Rock Through/ Across It) None	Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass)	Suburban pt Row Crop pt Open Pasture pt Urban/ Industrial	vegetated Banks pt Combination of Stal and Eroding Banks pt Raw, Collapsing Banks	3 pt Partly
Wide (Can't Throw A Rock Through/ Across It) Narrow (Can Throw A Rock Through/ Across It) None 0 pt	Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt 0	Suburban pt Row Crop pt Open Pasture pt Urban/ Industrial	vegetated Banks Combination of Stal and Eroding Banks Raw Collapsing Banks pt Flow Types Th	Partly 2 pt None 0 pt Score: 5 at You See (Add Points):
Wide (Can't Throw A Rock Through/ Across It) Narrow (Can Throw A Rock Through/ Across It) None V. Depth & Velocity	Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt 0	Suburban pt Row Crop pt Open Pasture pt Urban/ Industrial	vegetated Banks Combination of Stal and Eroding Banks Raw, Collapsing Banks pt	Score: 5 at You See (Add Points): why Takes instream None
Wide (Can't Throw A Rock Through/ Across It) Narrow (Can Throw A Rock Through/ Across It) None V. Depth & Velocity a) Deepest Pool is Chest Deep 8 pt 4 pt	Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt	Suburban Pot Row Crop Open Pasture Otheck ALL The Very Fast: Hard to Stand in the Current	Position of State and Eroding Banks Raw, Collapsing Banks Position of State and Eroding Banks Raw Collapsing Banks Position of State and Eroding Banks Raw Moderate: State of State and Eroding Banks	Partly 2 pt None 0 pt Score: at You See (Add Points): None
Wide (Can't Throw A Rock Through/ Across It) Narrow (Can Throw A Rock Through/ Across It) None O pt V. Depth & Velocity a) Deepest Pool is Chest Deep 8 pt Waist Deep	Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt O At Least: Knee Deep Ankle Deep	Suburban pt Row Crop pt Open Pasture pt Urban/ Industrial Check ALL The Very Fast: Hard to	Combination of Stal and Eroding Banks Raw, Collapsing Banks Provided Types The Moderate: Story Objects Down Nearly Abser	Score: 5 at You See (Add Points): None O pt None
Wide (Can't Throw A Rock Through/ Across It) Narrow (Can Throw A Rock Through/ Across It) None O pt V. Depth & Velocity a) Deepest Pool is Chest Deep 8 pt Waist Deep 6 pt Waist Deep 0 pt	Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt	Suburban Pot Row Crop Pot Open Pasture Ourban/ Industrial Check ALL The Very Fast: Hard to Stand in the Current Fast: Quickly Takes Objects Downstream	Combination of Stal and Eroding Banks Raw, Collapsing Banks Pt Raw, Collapsing Banks Types Th Moderate: Showing Slow: Flow Nearly Abser	Partly 2 pt None 0 pt None 0 pt None 1 pt
Wide (Can't Throw A Rock Through/ Across It) Narrow (Can Throw A Rock Through/ Across It) None Opt V. Depth & Velocity a) Deepest Pool is Chest Deep 8 pt Waist Deep 6 pt VI. Riffles/Runs (Are	Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt 0 At Least: Knee Deep Ankle Deep as Where Current is I	Suburban Pot Row Crop Pot Open Pasture Ourban/ Industrial Check ALL The Very Fast: Hard to Stand in the Current Fast: Quickly Takes Objects Downstream Fast/Turbulent, S	Combination of Stal and Eroding Banks Raw, Collapsing Banks Provided Types The Moderate: Sking Skiow: Flow Nearly Absers Surface May Be B	Score: 5 at You See (Add Points): by your partly 2 pt None 0 pt None troken) Score:
Wide (Can't Throw A Rock Through/ Across It) Narrow (Can Throw A Rock Through/ Across It) None V. Depth & Velocity a) Deepest Pool is Chest Deep 8 pt Waist Deep 6 pt VI. Riffles/Runs (Area) Knee Deep or	Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt 0 At Least: Knee Deep Ankle Deep 3 pt Ankle Deep or	Suburban Pot Row Crop Pot Open Pasture Pot Urban/ Industrial Check ALL The Very Fast: Hard to Stand in the Current Fast: Quickly Takes Objects Downstream Fast/Turbulent, S b) Riffle/R	Combination of Stal and Eroding Banks Raw, Collapsing Banks Pt Raw, Collapsing Banks Types Th Moderate: Showing Slow: Flow Nearly Abser	Score: Score: Are: Smaller Than Your
Wide (Can't Throw A Rock Through/ Across It) Narrow (Can Throw A Rock Through/ Across It) None O pt V. Depth & Velocity a) Deepest Pool is Chest Deep 8 pt Waist Deep 6 pt VI. Riffles/Runs (Are Knee Deep or Deeper & Fast	Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt 0 At Least: b) Knee Deep Ankle Deep as Where Current is fine and the second shown as the se	Suburban Pot Row Crop Pot Open Pasture Pot Urban/ Industrial Check ALL The Very Fast: Hard to Stand in the Current Fast: Quickly Takes Objects Downstream Fast/Turbulent, S b) Riffle/R Fist Size 7 pt	Combination of Stal and Eroding Banks Raw, Collapsing Banks Flow Types Th Moderate: Slobjects Down 1 pt Slow: Flow Nearly Abser Surface May Be B Run Substrates or Larger	Score: Score: Are: Partly
Wide (Can't Throw A Rock Through/ Across It) Narrow (Can Throw A Rock Through/ Across It) None Opt V. Depth & Velocity a) Deepest Pool is Chest Deep 8 pt Waist Deep 6 pt VI. Riffles/Runs (Are a) Riffles/Runs Are Knee Deep or Deeper & Fast Ankle/Calf Deep & Fast	Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt 0 At Least: Knee Deep Ankle Deep Ankle Deep Ankle Deep or Less & Slow 4 pt Do Not Exist	Suburban Pot Row Crop Pot Open Pasture Pot Urban/ Industrial Pot Past: Hard to Stand in the Current Fast: Quickly Takes Objects Downstream Pot Past: P	Combination of State and Eroding Banks Raw, Collapsing Banks Provided Types The Moderate: Show: Flow Nearly Abser Surface May Be Brun Substrates or Larger Than Fist Size, er Than	Score: Score: Score: Are: Smaller Than Your Fingernalls or Do Not Exist
Wide (Can't Throw A Rock Through/ Across It) Narrow (Can Throw A Rock Through/ Across It) None V. Depth & Velocity a) Deepest Pool is Chest Deep 8 pt Waist Deep 6 pt VI. Riffles/Runs (Are a) Riffles/Runs Are Knee Deep or Deeper & Fast Ankle/Calf	Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt 0 At Least: b) Knee Deep Ankle Deep as Where Current is fine and the second shown as the se	Suburban pt Row Crop pt Open Pasture pt Urban/ Industrial Check ALL The Very Fast: Hard to Stand in the Current Fast: Quickly Takes Objects Downstream Fast/Turbulent, S b) Riffle/R Fist Size 7 pt Smaller	Combination of State and Eroding Banks Raw, Collapsing Banks Provided Types The Moderate: Show: Flow Nearly Abser Surface May Be Brun Substrates or Larger Than Fist Size, er Than	Score: Score: Score: Are: Smaller Than Your Fingernalls or Do Not Exist

Date: 4/15	itizens Qualitat	ive Habitat Eva	aluation Ind	ex CQHEI Total
Vol Site	16 River and Watershe		ele e 700	
I. Substrate (Bottor	n Type)			Score:
a) Size		b) "Smotherii	na" I c) "Silting"
Mostly Large (Fist Size or Bigger)	Mostly Small (Smalle Than Fingernail, but 6 pt Coarse, or Bedrock)	r Are Fist Size	and Larger hered By	Are Silts and Clays Distributed Throughout Stream? Symptoms: Light Kicking
Mostly Medium (Smaller than Fist, but 10 pt Bigger than Fingernail)	Mostly Very Fine (No Coarse, Sometimes 0 pt Greasy or Mucky)	Large Pied	ottom with Few	of Bottom Results in Substantial Clouding of Stream for More than a Minute or Two
II. Fish Cover (Hidi	ng Places) - Add 2 P	oints For Each One	e Present	Score: 2
Underwater Tree Roots (Large) 2 pt Underwater Tree Rootlets (Fine)	Boulders 2 Backwaters, Oxbows or Side	Downed Trees, Logs, Branches pt Shallow, Slow Areas for	Water Plants 2 pt Deep Areas (Chest Deep) 2 pt	2 pt Shrubs, Small Trees that Hang Close Over the Bank
III. Stream Shape a	nd Human Alteratior			Score: Ø
,	"Sinuousity" of Cha	nnel b) Hov	w Natural is The	e Site?
2 or More Good Bends 8 pt	1 or 2 Good Bends	12 pt	ostly Natural	Many Man-made Changes, but still some natural conditions left (e.g., trees, meanders)
Mostly Straight Some "Wiggle"	Very Straight	Ma 9 pt (e	Few Minor an-made Changes g., a bridge, some eambank changes)	Heavy, Man-made Changes (e.g., leveed or channelized)
		•		
IV Stream Forests	& Wetlands (Riparia	n Area) & Erosion		Score: 5
	& Wetlands (Riparia		ank Erosion -	
IV. Stream Forests a) Width of Riparian Forest &	& Wetlands (Riparia b) Land Use - Mos Forest/Wetland	tly: c) Ba	ank Erosion - ypically:	Score: 5 d) How Much of Stream is Shaded?
a) Width of	b) Land Use - Mos Forest/Wetland 5 pt 2	tly: c) Ba	ypically: Stable Hard or Well-	d) How Much of Stream is Shaded?
a) Width of Riparian Forest & Wetland - Mostly:	b) Land Use - Mos Forest/Wetland 5 pt Shrubs	Conservation Tillage Suburban C) Ba	ypically:	d) How Much of
a) Width of Riparian Forest & Wetland - Mostly:	b) Land Use - Mos Forest/Wetland 5 pt Shrubs 4 pt Overgrown	Conservation Tillage Suburban pt Resurces	ypically: Stable Hard or Well- Vegetated Banks Combination of Stable	d) How Much of Stream is Shaded?
a) Width of Riparian Forest & Wetland - Mostly: Wide (Can't Throw A Rock Through/ 8 pt Across It) Narrow (Can Throw	b) Land Use - Mos Forest/Wetland 5 pt Shrubs 4 pt 1	Conservation Tillage pt Suburban pt Row Crop pt 2 pt	ypically: Stable Hard or Well- Vegetated Banks Combination of Stable and Eroding Banks	d) How Much of Stream is Shaded?
a) Width of Riparian Forest & Wetland - Mostly: Wide (Can't Throw A Rock Through/ 8 pt Across It)	Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture	Conservation Tillage pt Suburban pt Row Crop pt Open Pasture	ypically: Stable Hard or Well- Vegetated Banks Combination of Stable	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None
a) Width of Riparian Forest & Wetland - Mostly: Wide (Can't Throw A Rock Through/ 8 pt Across It) Narrow (Can Throw A Rock Through/	b) Land Use - Mos Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt 0	Conservation Tillage pt Suburban pt Row Crop pt Open Pasture	ypically: Stable Hard or Well- Vegetated Banks Combination of Stable and Eroding Banks Raw, Collapsing	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt
a) Width of Riparian Forest & Wetland - Mostly: Wide (Can't Throw A Rock Through/ 8 pt Across It) Narrow (Can Throw A Rock Through/ Across It)	b) Land Use - Mos Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass)	Conservation Tillage pt Suburban pt Row Crop pt Open Pasture pt O Ba	ypically: Stable Hard or Well- Vegetated Banks Combination of Stable and Eroding Banks Raw, Collapsing	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None
a) Width of Riparian Forest & Wetland - Mostly: Wide (Can't Throw A Rock Through/ Across It) Narrow (Can Throw A Rock Through/ 5 pt Across It) None	b) Land Use - Mos Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt 0	Conservation Tillage pt Suburban pt Row Crop pt Open Pasture pt Urban/ Industrial	ypically: Stable Hard or Well- Vegetated Banks Combination of Stable and Eroding Banks Raw, Collapsing	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None
a) Width of Riparian Forest & Wetland - Mostly: Wide (Can't Throw A Rock Through/ 8 pt Across It) Narrow (Can Throw A Rock Through/ A rocss It) None 0 pt	b) Land Use - Mos Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt 0	Conservation Tillage pt Suburban pt Row Crop pt Open Pasture pt Urban/ Industrial	ypically: Stable Hard or Well- Vegetated Banks Combination of Stable and Eroding Banks Raw, Collapsing Banks	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt
a) Width of Riparian Forest & Wetland - Mostly: Wide (Can't Throw A Rock Through/ Across It) Narrow (Can Throw A Rock Through/ 5 pt Across It) None 0 pt V. Depth & Velocity	b) Land Use - Mos Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt 0	Conservation Tillage pt Suburban pt Row Crop pt Open Pasture pt Urban/ Industrial pt Check ALL The Fic Very Fast: Hard to	ypically: Stable Hard or Welf- Vegetated Banks Combination of Stable and Eroding Banks Raw, Collapsing Banks Dw Types That	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None Score: You See (Add Points): Takes None
a) Width of Riparian Forest & Wetland - Mostly: Wide (Can't Throw A Rock Through/ 8 pt Across It) Narrow (Can Throw A Rock Through/ Across It) None 0 pt V. Depth & Velocity a) Deepest Pool is	b) Land Use - Mos Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt At Least: Knee Deep	Conservation Tillage pt Suburban pt Row Crop pt Open Pasture pt Urban/ Industrial pt Very Fast: Hard to Stand in the Current	ypically: Stable Hard or Well- Vegetated Banks Combination of Stable and Eroding Banks Raw, Collapsing Banks Dw Types That Moderate: Slowly Objects Downstre	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None Score: You See (Add Points): Takes None
a) Width of Riparian Forest & Wetland - Mostly: Wide (Can't Throw A Rock Through/ 8 pt Across It) Narrow (Can Throw A Rock Through/ 5 pt Across It) None 0 pt V. Depth & Velocity a) Deepest Pool is Chest Deep 8 pt 4 pt Waist Deep	b) Land Use - Mos Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt Knee Deep Ankle Deep	Conservation Tillage pt Suburban Pt Row Crop pt Open Pasture pt Urban/ Industrial pt Check ALL The Fix Very Fast: Hard to Stand in the Current Fast: Quickly Takes Objects Downstream	ypically: Stable Hard or Well- Vegetated Banks Combination of Stable and Eroding Banks Raw, Collapsing Banks Dw Types That Moderate: Slowly Objects Downstre	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt You See (Add Points): Takes Mone
a) Width of Riparian Forest & Wetland - Mostly: Wide (Can't Throw A Rock Through/ 8 pt Across It) Narrow (Can Throw A Rock Through/ 5 pt Across It) None 0 pt V. Depth & Velocity a) Deepest Pool is Chest Deep 8 pt 4 pt Waist Deep 6 pt 0 pt	b) Land Use - Mos Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt Knee Deep Ankle Deep 3 pt	Conservation Tillage pt Suburban pt Row Crop pt Open Pasture pt Urban/ Industrial pt Check ALL The Flow Very Fast: Hard to Stand in the Current Fast: Quickly Takes Objects Downstream	ypically: Stable Hard or Well-Vegetated Banks Combination of Stable and Eroding Banks Raw, Collapsing Banks Types That Moderate: Slowly Objects Downstre Slow: Flow Nearly Absent	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt Score: You See (Add Points): None
a) Width of Riparian Forest & Wetland - Mostly: Wide (Can't Throw A Rock Through/ 8 pt Across It) Narrow (Can Throw A Rock Through/ 5 pt Across It) None 0 pt V. Depth & Velocity a) Deepest Pool is Chest Deep 8 pt 4 pt Waist Deep 6 pt 0 pt VI. Riffles/Runs (Ar	b) Land Use - Mos Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt Knee Deep Ankle Deep Ankle Deep a pt ceas Where Current is	Conservation Tillage pt Suburban pt Row Crop pt Open Pasture pt Urban/ Industrial pt Very Fast: Hard to Stand in the Current Fast: Quickly Takes Objects Downstream C Bat T T T T T T T T T T T T T T T T T T T	ypically: Stable Hard or Well- Vegetated Banks Combination of Stable and Eroding Banks Raw, Collapsing Banks DW Types That Moderate: Stowly Objects Downstre 1 pt Slow: Flow Nearly Absent 1 pt ace May Be Brok	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt None Takes Opt None
a) Width of Riparian Forest & Wetland - Mostly: Wide (Can't Throw A Rock Through/ 8 pt Across It) Narrow (Can Throw A Rock Through/ Across It) None O pt V. Depth & Velocity a) Deepest Pool is Chest Deep 6 pt Waist Deep 6 pt VI. Riffles/Runs (Ara) Knee Deep or	b) Land Use - Mos Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt Ankle Deep Ankle Deep Ankle Deep or Ankle Deep or	Conservation Tillage pt Suburban pt Row Crop pt Open Pasture pt Urban/ Industrial pt Very Fast: Hard to Stand in the Current Fast: Quickly Takes Objects Downstream C Bat T T T T T T T T T T T T T T T T T T T	ypically: Stable Hard or Well- Vegetated Banks Combination of Stable and Eroding Banks Raw, Collapsing Banks DW Types That Moderate: Slowly Objects Downstre Slow: Flow Nearly Absent ace May Be Brok Substrates Are	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt None O pt Score: S You See (Add Points): Takes O pt Smaller Than Your
a) Width of Riparian Forest & Wetland - Mostly: Wide (Can't Throw A Rock Through/ 8 pt Across It) Narrow (Can Throw A Rock Through/ 5 pt Across It) None 0 pt V. Depth & Velocity a) Deepest Pool is Chest Deep 8 pt 4 pt Waist Deep 6 pt 0 pt VI. Riffles/Runs (Ar a) Riffles/Runs Ar Cheeper & Fast 8 pt	b) Land Use - Mos Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt Ankle Deep Ankle Deep Ankle Deep Ankle Deep or Less & Siow 4 pt Ankle Deep or Less & Siow	Conservation Tillage pt Suburban pt Row Crop pt Open Pasture pt Urban/ Industrial pt Very Fast: Hard to Stand in the Current Fast: Quickly Takes Objects Downstream Fast/Turbulent, Surfactor Conservation Fist Size or Lagrange Tillage Typt	ypically: Stable Hard or Well-Vegetated Banks Combination of Stable and Eroding Banks Raw, Collapsing Banks Dw Types That Moderate: Slowly Objects Downstre Slow: Flow Nearly Absent 1 pt Slow: Flow Nearly Absent acce May Be Brok Substrates Are arger O pt	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt None Takes opt Add Points): Mone (en) Score:
a) Width of Riparian Forest & Wetland - Mostly: Wide (Can't Throw A Rock Through/ 8 pt Across It) Narrow (Can Throw A Rock Through/ 5 pt Across It) None O pt V. Depth & Velocity a) Deepest Pool is Chest Deep 6 pt Waist Deep 6 pt VI. Riffles/Runs (Ar a) Riffles/Runs Ar Knee Deep or Deeper & Fast 8 pt Ankle/Calf Deep & Fast	b) Land Use - Mos Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt Ankle Deep Ankle Deep Ankle Deep or Less & Slow 4 pt Do Not Exist	Conservation Tillage pt Suburban pt Row Crop pt Open Pasture pt Urban/ Industrial pt Check ALL The Fice Very Fast: Hard to Stand in the Current Fast: Quickly Takes Objects Downstream Fast/Turbulent, Surfe b) Riffle/Run Fist Size or La T pt Smaller Than but Larger Than	ypically: Stable Hard or Well-Vegetated Banks Combination of Stable and Eroding Banks Raw, Collapsing Banks Types That Moderate: Slowly Objects Downstre Slow: Flow Nearly Absent 1 pt Acce May Be Brok Substrates Are arger Fist Size,	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt None O pt Score: S You See (Add Points): Takes O pt Smaller Than Your
a) Width of Riparian Forest & Wetland - Mostly: Wide (Can't Throw A Rock Through/ Across It) Narrow (Can Throw A Rock Through/ Across It) None O pt V. Depth & Velocity a) Deepest Pool is Chest Deep 8 pt 4 pt 4 pt Waist Deep 6 pt VI. Riffles/Runs (Ar a) Riffles/Runs Ar Knee Deep or Deeper & Fast Ankle/Calf	b) Land Use - Mos Forest/Wetland 5 pt Shrubs 4 pt Overgrown Fields 3 pt Fenced Pasture 2 pt Park (Grass) 2 pt Ankle Deep Ankle Deep Ankle Deep Ankle Deep or Less & Siow 4 pt Ankle Deep or Less & Siow	Conservation Tillage pt Suburban pt Row Crop pt Open Pasture pt Urban/ Industrial pt Very Fast: Hard to Stand in the Current Fast: Quickly Takes Objects Downstream Fast/Turbulent, Surfiller b) Riffle/Run Fist Size or Late 7 pt Smaller Than	ypically: Stable Hard or Well-Vegetated Banks Combination of Stable and Eroding Banks Raw, Collapsing Banks Types That Moderate: Slowly Objects Downstre Slow: Flow Nearly Absent 1 pt Acce May Be Brok Substrates Are arger Fist Size,	d) How Much of Stream is Shaded? Mostly 3 pt Partly 2 pt None 0 pt None O pt Score: S You See (Add Points): Takes O pt Smaller Than Your

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Date: 4/15	itizens Quali	tative Habit	at Evaluation Ir	19.5
Vol Site	River		Jack P 4005	CQHEI Total
ID: LD:		rshed: OTA		
I. Substrate (Bottom	ı Type)	I la) ((C		Score: O
a) Size	Billionthy Cmall (C	i	nothering" re Fist Size and Larger	c) "Silting" Are Silts and Clays
Mostly Large (Fist Size or Bigger)	Mostly Small (S Than Fingernail 6 pt Coarse, or Bedr	, but Still P	ieces Smothered By ands/Sitts?	Distributed Throughout NO Stream? 5 pt
Mostly Medium (Smaller than Fist, but Bigger than Fingernal)	Mostly Very Fine Coarse, Someti 0 pt Greasy or Muck	mes VES	Symptoms: Hard to Move Large Pleces, Often Black on Bottom with Few Insects	Symptoms: Light Kicking of Bottom Results in Substantial Clouding of Stream for More than a Minute or Two
II. Fish Cover (Hidin	g Places) - Add	2 Points For Ea	ich One Present	Score: /D
Underwater Tree	Boulders	Downed Tree	s, Water Plants	Undercut Banks
Roots (Large) 2 2 pt 2 Underwater Tree	pt Backwaters,	2 pt Shallow, Slow	2 pt	2 pt Shrubs, Small Trees
Rootlets (Fine)	Oxbows or Side	Areas for 2 pt Small Fish	(Chest Deep)	that Hang Close 2 pt Over the Bank
III. Stream Shape ar			•	Score: O
a) "Curviness" or "			b) How Natural Is 1	he Site?
2 or More Good Bends	1 or 2 Good Bend	is	- Marrie Martine	Many Man-made
8 pt 77	6 pt		Mostly Natural 12 pt	Changes, but still some 6 pt natural conditions left (e.g., trees, meanders)
Markly Observed	Non- Strain		A Few Minor	Heavy, Man-made
Mostly Straight Some "Wiggle"	Very Straig	nt	Man-made Changes 9 pt (e.g., a bridge, some streambank changes)	Changes (e.g., leveed 0 pt or channelized)
			steambank changes)	P.
IV. Stream Forests	& Wetlands (Ripa	ırian Area) & E	rosion	Score: 8,5
a) Width of	b) Land Use - N		c) Bank Erosion	
Riparian Forest &		Conservation Tillage	Typically:	Stream is Shaded?
Wetland - Mostly:	5 pt Shrubs	2 pt Suburban	Stable Hard or Well- Vegetated Banks	Mostly
Wide (Can't Throw A Rock Through/	4 pt	1 pt	4 pt Combination of Stab	3 pt
8 pt Across It) Narrow (Can Throw	Overgrown Fields	1 pt	and Eroding Banks	Partly 2 pt
A Rock Through/ 5 pt Across It)	Fenced Pasture	Open Pasture	Raw, Collapsing Banks	None
None	2 pt	0 pt Urban/	0 pt	0 pt
0 pt 2.5	Park (Grass) 2 pt	Industrial 0 pt	2 25 C	(V)
V. Depth & Velocity			:	Score: /
a) Deepest Pool is	At Least:	b) Check ALL	The Flow Types Tha	nt You See (Add Points):
Chest Deep	Knee Deep	Very Fast: Hard Stand in the Cur	rent LL Objects Down	stream Light
8 pt 4 pt Waist Deep		2 pt	1 pt	0 pt
	Ankle Deen	Fast: Quickly Ta		1 1
6 pt 0 pt	Ankle Deep	Fast: Quickly Ta Objects Downsti		
6 pt 0 pt VI. Riffles/Runs (Are	as Where Current	Objects Downstr 3 pt is Fast/Turbuler	ream 1 pt Nearly Absent nt, Surface May Be Br	oken) Score: 🙆
VI. Riffles/Runs (Are a) Riffles/Runs Are	as Where Current	Objects Downstr	nt, Surface May Be Br le/Run Substrates	oken) Score: 🙆
6 pt 0 pt VI. Riffles/Runs (Are	as Where Current	Objects Downstr	ream 1 pt Nearly Absent nt, Surface May Be Br	oken) Score: Are: Smaller Than Your Fingernalis or Do Not Exist
6 pt 0 pt VI. Riffles/Runs (Are a) Riffles/Runs Are Knee Deep or Deeper & Fast 8 pt Ankie/Calf Deep & Fast	Ankle Deep or Less & Slow Do Not Exist	Objects Downstr	nt, Surface May Be Brile/Run Substrates A	oken) Score: Are: Smaller Than Your Fingernalis or Do Not Exist
6 pt 0 pt VI. Riffles/Runs (Are a) Riffles/Runs Are Knee Deep or Deeper & Fast Ankle/Calf	Ankle Deep or Less & Slow	Objects Downstr	nt, Surface May Be Brile/Run Substrates At Size or Larger aller Than Fist Size,	oken) Score: Are: Smaller Than Your Fingernalis or Do Not Exist
6 pt 0 pt VI. Riffles/Runs (Are a) Riffles/Runs Are Knee Deep or Deeper & Fast 8 pt Ankie/Calf Deep & Fast	Ankle Deep or Less & Slow Do Not Exist	Objects Downstr	nt, Surface May Be Brile/Run Substrates At Size or Larger Taller Than Fist Size, Larger Than	oken) Score: Are: Smaller Than Your Fingernalis or Do Not Exist

Date: 4/15	Citizens Qualitative Ha	bitat Evaluation In	dex 57 CQHEI Total
Vol ID:	Site 18 River and Watershed: Blue	rk Creek @ 530E	- Garner rotal
I. Substrate (Bo			Score: 1/3
a) Size		"Smothering"	c) "Silting"
Mostly Large (Fist Size or Bigg	Mostly Small (Smaller Than Fingernail, but Still 6 pt Coarse, or Bedrock)	Are Fist Size and Larger Pieces Smothered By	Are Silts and Clays Distributed Throughout Stream? 5 pt
Mostly Medium (Smaller than Fis 10 pt Bigger than Finge	ernail) 0 pt Greasy or Mucky) Yt	Symptoms: Hard to Move Large Pieces, Often Black on Bottom with Few Insects	Symptoms: Light Kicking of Bottom Results in Substantial Clouding of Stream for More than a Minute or Two
T. E. L. O (1	y Little Discours Associated	2.5	2.5 Score: 12
Underwater Tree Roots (Large) 2 pt Underwater Tree Rootlets (Fine)	2 pt Logs, B	d Trees, ranches 2 pt 7, Slow Deep Areas (Chest Deep)	Undercut Banks 2 pt Shrubs, Small Trees that Hang Close Over the Bank
	e and Human Alterations		Score: 13,5
a) "Curviness" 2 or More Good Bends	or "Sinuousity" of Channel 1 or 2 Good Bends	b) How Natural is T Mostly Natural 12 pt	Many Man-made Changes, but still some natural conditions left (e.g., trees, meanders)
Mostly Straight Some "Wiggle"	Very Straight	A Few Minor Man-made Changes 9 pt (e.g., a bridge, some streambank changes)	Heavy, Man-made Changes (e.g., leveed or channelized)
	sts & Wetlands (Riparian Area)	· ·	Score: 9,7
a) Width of Riparian Fores Wetland - Most Wide (Can't Thro A Rock Through/ Across It) Narrow (Can Through/ A Rock Through/ A Rock Through/ 5 pt Across It) None 0 pt 2.5	Shrubs 2 pt Suburba 4 pt Shrubs 1 pt Suburba Overgrown Row Cr 3 pt Penced Pasture Open P 2 pt Open P	stable Hard or Well-Vegetated Banks 4 pt Combination of Stable and Eroding Banks 2 pt Raw, Collapsing Banks 0 pt	2 pt None 0 pt
V. Depth & Velo		ALL The Flow Types Tha	
a) Deepest Pool Chest Deep 8 pt Waist Deep 6 pt VI. Riffles/Runs a) Riffles/Runs Knee Deep or Deeper & Fast Ankle/Calf Deep & Fast	Knee Deep 4 pt Ankle Deep 0 pt Knee Deep 2 pt Fast: Quic Objects Deep 3 pt (Areas Where Current is Fast/Turk	Hard to ne Current Moderate: Slow Objects Downs 1 pt Slow: Flow Nearly Absent Sulface May Be Browns Riffle/Run Substrates A Fist Size or Larger Smaller Than Fist Size, but Larger Than	oken) Score: Smaller Than Your Fingernails of Do Not Exist

Date: 4/15	itizens Qualitati	ive Habitat	Evaluation In	dex 92.5
Vol Site ID:	River and Watershed	13 Mak	Creek @ Rt 1	OWILLIOUA
I. Substrate (Botton				Score: 17
a) Size	турс,	b) "Smot	hering" I	c) "Silting"
Mostly Large (Fist Size or Bigger)	Mostly Small (Smalle Than Fingernail, but S 6 pt Coarse, or Bedrock)	Are Fi	ist Size and Larger s Smothered By s/Silts?	Are Sitts and Clays Distributed Throughout NO Stream? 5 pt
Mostly Medium (Smaller than Fist, but 10 pt Bigger than Fingernail)		Large	nptoms: Hard to Move ge Pieces, Often ck on Bottom with Few ects	YES 0 pt Symptoms: Light Kicking of Bottom Results in Substantial Clouding of Stream for More than a Minute or Two
	2- Di		2.5	7.5
Underwater Tree Roots (Large) 2 pt Underwater Tree Rootlets (Fine) 2 pt	Boulders Pt Backwaters, Oxbows or Side Channels Backwaters Channels	Downed Trees, Logs, Branches of Shallow, Slow Areas for Small Fish	Water Plants 2 pt Deep Areas (Chest Deep) 2 pt	Score: /6 Undercut Banks 2 pt Shrubs, Small Trees that Hang Close Qver the Bank
	nd Human Alteration		Notes Notes and In T	Score: 20
a) "Curviness" or " 2 or More Good Bends 8 pt	'Sinuousity" of Char	inel b)) How Natural Is T Mostly Natural pt	Many Man-made Changes, but still some natural conditions left (e.g., trees, meanders)
Mostly Straight Some "Wiggle"	Very Straight	91	streambank changes)	Heavy, Man-made Changes (e.g., leveed or channelized)
	& Wetlands (Ripariar	·		Score: 20
a) Width of	b) Land Use - Most	tly: Conservation	c) Bank Erosion -	d) How Much of
Riparian Forest & Wetland - Mostly: Wide (Can't Throw A Rock Through/ Across It)	Forest/Wetland 5 pt 2; Shrubs 4 pt 1; Overgrown Fields	Tillage ot Suburban	Typically: Stable Hard or Well- Vegetated Banks Combination of Stable and Eroding Banks	Stream is Shaded? Mostly 3 pt Partty
Narrow (Can Throw A Rock Through/ 5 pt Across It) None 0 pt	3 pt 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Open Pasture ot Urban/ Industrial	Raw, Collapsing Banks	2 pt None 0 pt
V. Depth & Velocity				Score: 7
a) Deepest Pool is Chest Deep 8 pt 4 pt Waist Deep 6 pt VI. Riffles/Runs (Are a) Riffles/Runs Are Knee Deep or Deeper & Fast Ankle/Calf	Knee Deep 2 pt 3 pt as Where Current is F	Very Fast: Hard to Stand in the Current Fast: Quickly Takes Objects Downstream ast/Turbulent, b) Riffle/ Fist Size 7 pt	Moderate: Slow Objects Downsi 1 pt Slow: Flow Nearly Absent	oken) Score: 12.5 re: Smaller Than Your Fingernails or Do Not Exist
6 pt Deep & Fast	0 pt	6 pt Fingern	ger Than ail し.5	



An Environmental Solutions Provider

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